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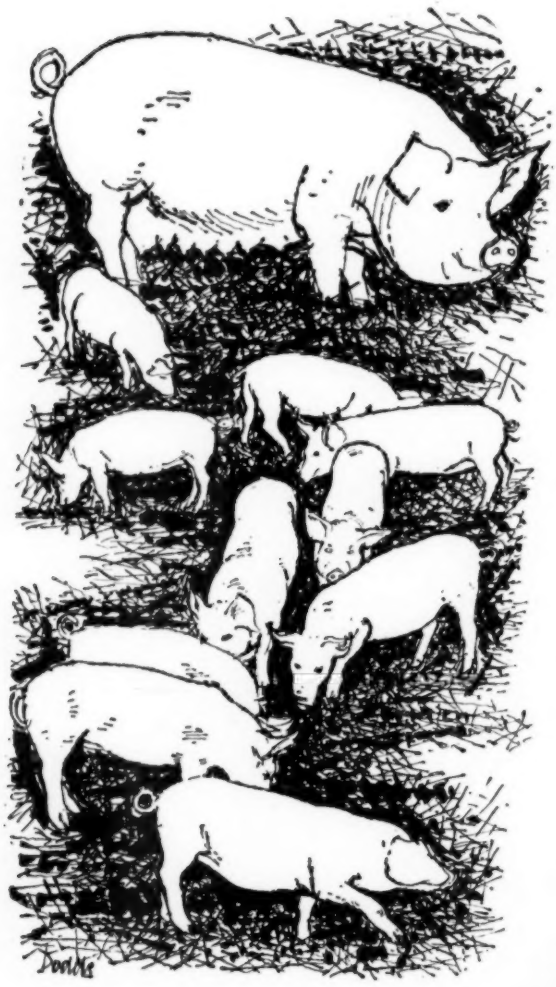

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THE VETERINARY RECORD

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Volume 72
No. 31

SATURDAY, JULY 30th, 1960

7 Mansfield Street,
London, W.1.
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Trichophyton mentagrophytes: Infection in the Chinchilla

BY

E. A. McPHERSON
Royal (Dick) School of Veterinary Studies

THE conditions known as "fur-slipping" in chinchillas is of debatable and possible variable aetiology. While some authorities ascribe the disease to dietary deficiencies others consider shock is sufficient to cause it. Blank *et al.* (1953), however, presented evidence which tended to indicate that "fur-slipping" was a mycotic infection caused by dermatophytes. They found *T. mentagrophytes* in chinchillas considered to be affected with "fur-slipping." Kelly and Anthony (1959) recovered *T. mentagrophytes* from similar lesions on the head and feet of chinchillas but were unsuccessful in recovering a dermatophyte from the lesions on the body described as "fur-chewing."

During the summer and autumn of 1959 a condition indistinguishable from "fur-slipping" appeared in herds in Britain amongst stock imported from the United States of America. The disease as seen in one outbreak is here described.

Description of the Outbreak

Three apparently healthy female chinchillas suckling week-old young were received by air from the United States of America in July, 1959. Four weeks after their arrival the breeder became aware of the presence of the disease, and on August 28th, as dietary supplements were having no effect, he sought professional assistance. Two adults and the two young of one of them were at that time affected and a few days later the single offspring of the second adult was also diseased. On October 8th one of the young of the third adult was affected while its litter mate and dam developed visible lesions a month later. The dam of the first affected litter gave birth to a further single offspring on November 12th; 3 weeks later this animal was affected. Throughout the whole period the 2 chinchillas which constituted the original herd remained unaffected.

Clinical Findings

The lesions were in general similar to those described by Blank and his fellow workers (*loc. cit.*). Breaking and falling out of hair, which gave the fur a "moth-eaten" appearance, was the first sign of disease. On 2 animals lesions were present only on the trunk region of the body. One suffered loss of hair from an area 2½ in. by 1 in. on the left loin, while the other had a similar lesion on the left shoulder. The skin was smooth but rather scaly in the centre and while there were a few truncated hairs throughout the area the margin of the lesion was sharply defined. In all the other cases loss of hair was confined to the head region. The upper lip, whisker area, nose, lower eyelids, upper face and ear were the sites affected, the distribution varying from case to case. The skin was soft, smooth and lightly covered by scurf and in a few places hair stumps were visible (Figs. 1, 2 and 3). A few whiskers were thickened and an occasional one was bent or broken. Under Wood's light these whiskers showed a white fluorescence. A similar fluorescence was found on the inside of an affected ear, on the feet and around the anus of affected animals. There was little erythema, except around the nostrils and whisker area, and pruritus was only a feature when these areas were involved.

Laboratory Findings

Within and around a fluorescent whisker treated with 10 per cent. NaOH, numerous spores were detected microscopically (Fig. 4), and *T. mentagrophytes* was easily cultured from a similar whisker. No fur hairs fluoresced and in no case was evidence of dermatophyte infection detectable microscopically in such material, but *T. mentagrophytes* was cultured from most of these samples, though sometimes after repeated attempts. In a biopsy sample taken from a smooth area of affected skin, spores were demon-

strated in hair follicles and a few hyphal fragments were present in the very thin keratinised layer of the epidermis (Fig. 5).

Treatment

Griseofulvin in the form of a sweetened emulsion was given orally for a month at the rate of 40 mg. per kg. bodyweight daily to 2 adults and 3 young. The requisite volume, mixed with a teaspoonful of a proprietary baby food* was accepted. In 10 days hair was growing in the centre of the back lesion and in a further 10 days the whole area was well covered. At the end of the month's treatment the hair was growing well on all the previously furless areas. After 25 days' treatment the few whiskers still fluorescent, were removed, and found to be positive microscopically.

On November 19th the shoulder lesion first noted 40 days previously on an untreated animal was covered with half-grown hair. One youngster which had recovered from an infection of the nose while under griseofulvin therapy developed a fresh lesion in an adjacent area of the face 3 weeks after the treatment ceased. A month later the whole area was covered by hair $\frac{1}{8}$ in. in length.

From November 24th all animals on the premises were given griseofulvin for a month at the same rate as before and after treatment all were healthy. At the end of the period the cages were cleaned and some new ones brought into use. All animals appeared healthy at the end of January.

Discussion

The finding of fluorescence in a *Trichophyton* spp. infection was disturbing. La Touche (1959), however, prompted by Vanbreuseghem (1950) has recently demonstrated fluorescence in the hairs of cats, mice and guinea-pigs infected with *T. quinckeanum*. He attributes the fluorescence to the activity of the parasite within the hair.

Disease was undoubtedly introduced by one or more infected adults. An examiner familiar with the disease in this species might detect these "carrier animals" on clinical examination, but the white and thickened appearance of affected whiskers under Wood's light will be found helpful.

The incubation period has not been recorded but it appears on the evidence in this outbreak that hair is lost 3 or 4 weeks after infection. Spontaneous cure was evident in a further 3 to 4 weeks in one untreated case. The appearance of new hair on the one lesion on an animal within 10 days of commencement of treatment suggests that recovery had already commenced spontaneously beforehand. In cattle such recoveries from dermatophyte infections have been attributed to immunity (McPherson, 1959) and it is probable that the same is true in chinchillas. This factor, together with the difficulty in demonstrating *T. mentagrophytes* in the fur hairs of the chinchilla, possibly accounts for the apparent success of dietetic adjustments in the treatment of some cases of "fur-slipping" and to erroneous deductions on the aetiology of at least a proportion of cases.

* "Farex" Glaxo Laboratories, Ltd.

The spores of *T. mentagrophytes* are known to remain viable for many months away from a host (McPherson, 1957) and they can be transported by the owner and the equipment or even be airborne as shown recently by Mackenzie (1960) to be true of *T. sulphurum* in man. In view of the close proximity of the original stock to infected stock it would be reasonable to presume the former were immune.

Griseofulvin is capable of speeding up the recovery but the recurrence of disease here reported leads one to postulate that if the drug is given early in the disease no immunity develops and the animals, if exposed to further infection, are liable to have recurrences. The persistence of infection in surface and intra-follicular debris and within hairs constitutes a stumbling block in the practical management of scalp ringworm in humans (Beare and Mackenzie, 1959). The failure of griseofulvin to produce a fungus-free zone at the base of infected chinchilla whiskers even after 3 weeks' treatment may be due to the fact that these hairs were no longer actively growing. The persistence of odd infected hairs in otherwise almost healed lesions was previously observed in *M. canis* infection in a litter of puppies treated over a period of 5 weeks with the drug. Considering the public health importance of pet animals as a source of infection for children, the veterinarian would be failing in his duty if he did not also prescribe efficient topical fungicidal dressings for animals not hospitalised, if he chooses to adopt griseofulvin therapy. That this drug is useful in the treatment of dermatomycosis has now been demonstrated by a number of workers in animals and in man, but that it must be regarded as still at the clinical trial stage, is clear from the observations of Beare and Mackenzie (1959) and of Barlow *et alia* (1959).

Acknowledgments.—I am indebted once again to Professor G. F. Boddie for the facilities to carry out this work, and to Mr. R. S. Hood, F.I.B.P., F.I.S.T., for the photographs and Mr. R. Brown, A.I.S.T., for technical assistance. To Glaxo Laboratories Ltd. by thanks are due for supplies of griseofulvin.

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E. A. McPHERSON—TRICHOPHYTON MENTAGROPHYTES: INFECTION IN THE CHINCHILLA

FIG. 1.—*T. mentagrophytes*—Chinchilla. Lesions on nose, face, lower eyelid and base of ear of a young animal.

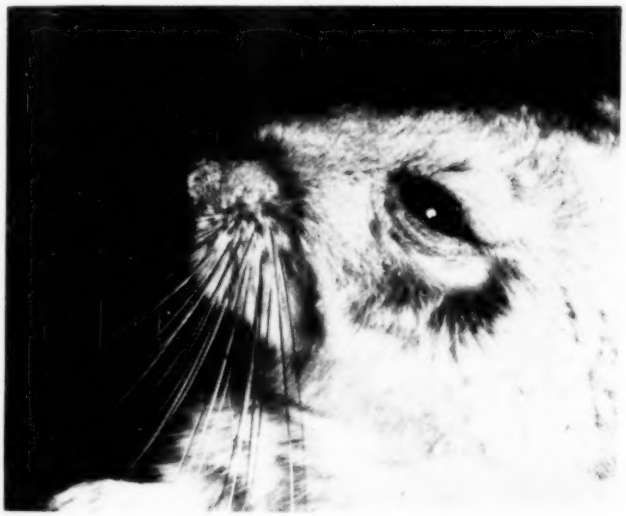

FIG. 2.—*T. mentagrophytes*—Chinchilla. Lesion on nose and lower eyelid of a young animal.

FIG. 3.—*T. mentagrophytes*—Chinchilla. Lesion on whisker area of an adult.

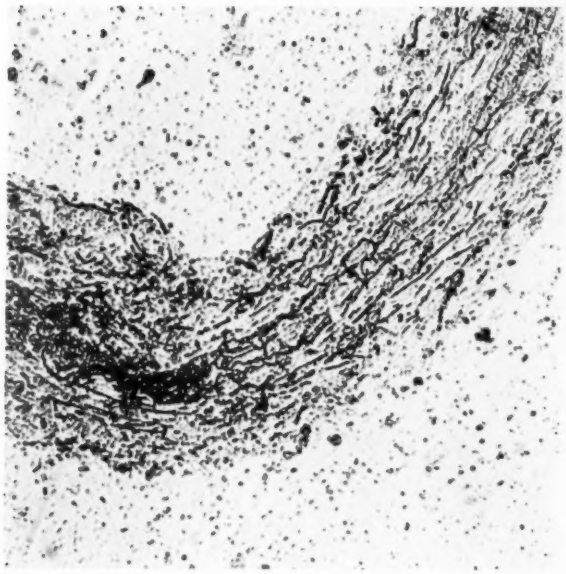

FIG. 4.—*T. mentagrophytes*—Chinchilla. Whisker treated with 10 per cent. NaOH. Note spores and hyphae within the hair.

FIG. 5.—*T. mentagrophytes*—Chinchilla. Section of hairless skin. P.A.S. stain. Note spores within hair stumps with the hair follicles. Hyphae visible in wall of follicle and in the thin keratinised layer of epidermis.

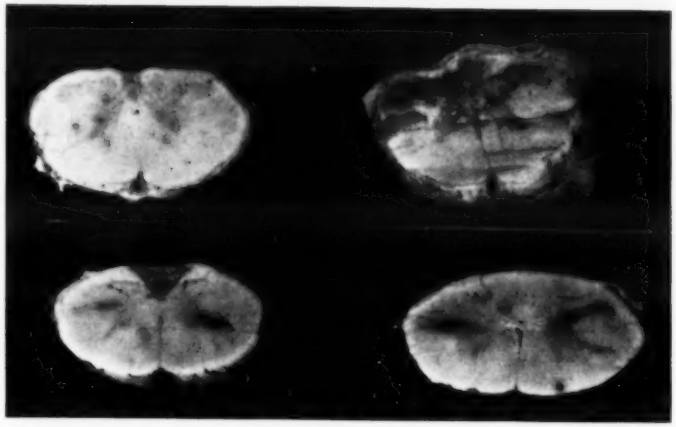

FIG. 3.—Caudal surface of sections of cord. Angiomatous malformation between C6-7 (top right); degeneration of dorsal columns C1 and C6 (top left and bottom left respectively). No macroscopic abnormality T1 (bottom right).

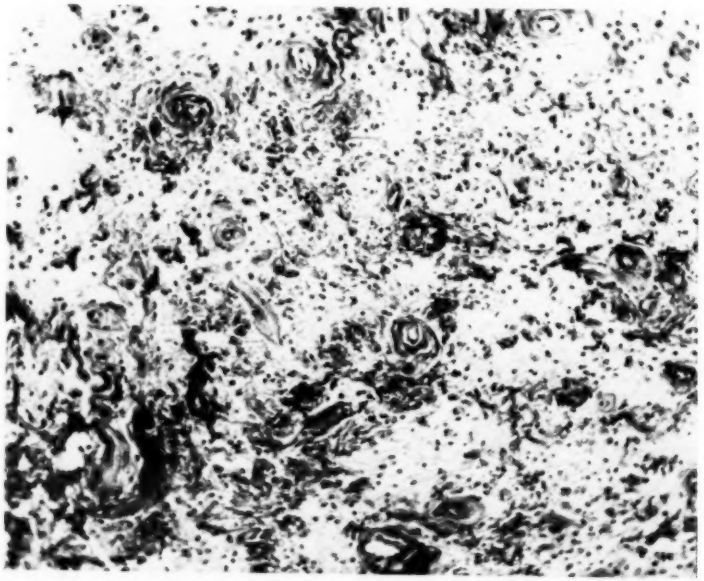

FIG. 5.—Proliferation of small vessels with fibrous thickening of walls. Haematoxylin and van Gieson x 160.

FIG. 4.—Angioma involving dorsal and dorso-lateral area of cord between C6-7. Masson's trichrome, about x 5.

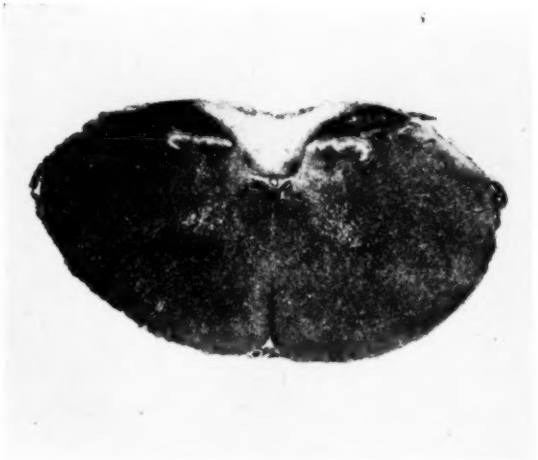

FIG. 6.—Degeneration of dorsal columns and "dorsal spino-cerebellar" tracts at C6. Lovez, about x 5.

Ataxia in a Horse due to an Angioma of the Spinal Cord

BY

A. C. PALMER and J. HICKMAN

Department of Veterinary Clinical Studies, University of Cambridge

SUMMARY.—The clinical and pathological features of a horse affected with a venous angioma of the spinal cord are described and compared with the "wobbler" syndrome.

THE purpose of this communication is to describe the clinical and pathological features of a case of ataxia in a horse due to a malacic lesion of the cervical cord caused by a venous angioma. Although this type of tumour is not common in the horse it is suggested that it may account for some cases of "wobbler" disease, the pathology of which has not been satisfactorily elucidated.

History: The subject was a 9-year-old Thoroughbred mare which had been in the owner's possession for 4 years and regularly hunted each season until February, 1957, when it was turned out to grass. At the end of the month it was seen to gallop into a hedge and thereafter remained slightly lame in the left foreleg and developed a progressive locomotor ataxia. The owner was not certain that there were no signs of inco-ordination before the collision with the hedge.

Clinical Observations: The horse was first examined in February, 1958. The sequence of movement of the legs was normal at all paces. At the walk the horse showed signs of ataxia involving all limbs and especially the left fore which when advanced, over-extended with a quick "flicking" movement that resulted in a goose-stepping action (Fig. 1). Occasionally the horse was observed to cross its forelegs resulting in a "scissor" action and it often failed to pick up its feet when walked over a small kerb. The action of the hind-legs was relatively normal except for intermittent "stringhalt" which was especially evident in the right hind when turning. At the canter the left fore was excessively protracted and adducted.

A curious sequence of events occurred when the horse was backed. The hind-legs moved backwards in a normal manner but the forelegs remained stationary, so that the horse immediately assumed an exaggerated lordosis (Fig. 2) and the forelegs were literally dragged backwards firmly retained in their extended position.

The degree of ataxia could be intensified by blindfolding the horse. Under these conditions the horse became excited, inco-ordinated, swayed violently from side to side, lunged forwards and had great difficulty in maintaining its balance.

Neurological Examination: Routine neurological tests revealed no abnormalities that could be attributed to the cranial nerves. There was no change of temperament and apart from the ataxia there were no signs of cerebellar disease. On examination of the forelegs, resistance to passive movement and the withdrawal reflexes were present and appeared normal on both sides; the triceps reflex was more brisk on the left side. There was no evidence of muscle atrophy, fasciculation or tremor and when the forelegs were pricked with a pin the horse looked towards the area being stimulated, which suggests that it could appreciate nocuous sensation. Resistance to passive movement and the withdrawal reflexes in the hind-legs were present and equal.

The predominant disability was inco-ordination and imbalance with incomplete retraction and abduction

FIG. 1.—Goose-stepping action of near foreleg.

FIG. 2.—Stance adopted when attempts made to back the animal.

of the left fore. It was considered that the manifestations of ataxia might be caused by a spinal cord lesion interfering with afferent impulses from both fore and hind-legs and that such a lesion would be at a level high enough to involve the forelimbs.

The horse was observed for a month before being destroyed by an intravenous injection of pentothal sodium.

Post-mortem Examination. A detailed macroscopical examination revealed no evidence of a narrowing of the vertebral canal, of a prolapsed intervertebral disc, of a fractured vertebra or of a superficial lesion of the cord. The cord was removed, fixed and when cut into segments a lesion was found between C6 to 7 (Fig. 3). The meninges around the affected area of the cord were thickened and the shape of the grey matter, especially on the left side, was distorted by yellow material which occupied the dorsal and dorso-lateral areas (Fig. 3). In the cervical cord, cranial to the lesion, the dorsal columns were slightly discoloured and this area of discoloration became progressively smaller in the more anterior segments (Fig. 3). Caudal to C7 the cord was macroscopically normal. No macroscopic abnormality was found in the brain.

The cerebrospinal fluid collected from the Cisterna magna was clear and had a cell count of 6 cells per c.c. and a protein content of 160 mg. per 100 ml.

Histopathology: The material was fixed in 10 per cent. formalin and prepared and stained by routine neurohistological methods. At the level of the lesion between C6 to 7 there is a pronounced venous angioma involving the dorsal and dorso-lateral areas (Fig. 4). The grey matter of the cord, apart from the dorsal horns, is extensively infiltrated by small blood vessels. The walls of these vessels are considerably thickened by fibrous tissue which in some cases results in their obliteration (Fig. 5). Lipid phagocytes are seen lying adjacent to these vessels and to the central canal. In the affected horns, most of the neurones have disappeared and a microglial reaction and a gliosis are present.

Rostral to the level C6 to 7 there is complete degeneration of the dorsal columns (Fig. 6) and in the medulla, nerve cells of the gracile and cuneate nuclei are reduced in number. There is no tract degeneration in the brainstem and neurones of the ventro-basal nucleus of the thalamus are intact. In the region of the degenerated dorsal columns a few lipid phagocytes can be seen in the vicinity of the vessels. Degeneration is also present in the area which, in man, is occupied by the dorsal spinocerebellar tract. Caudal to the main lesion slight tract degeneration is present in the area which, in man, is occupied by the lateral cortico-spinal tract.

At the level of the angioma the meninges are thickened and accompanied by degenerative changes in both the dorsal and ventral roots especially on the left side. Many of the nerve cells in the dorsal root ganglia are severely damaged as shown by vacuolation and an increase of satellite cells.

Discussion: Extensive studies of the spinal cord in the ataxic condition of horses known as "wobbler" disease have been reported. Dimock and Errington (1939) described constriction of the vertebral canal and intervertebral foramen associated with an osteoarthritis. Olafson (1942) reported pathological changes in the spinal cord and abnormalities of the cervical vertebrae. Jones, Doll and Brown (1954) studied 30 cases. Areas of malacia were demonstrated in segments of the cervical spinal cord. In 14 cases projections of vertebrae or intervertebral discs resulted in a narrowing of the vertebral canal, and in some of these a definite relationship to spinal malacia was demonstrated. In 16 cases in which lesions of the cord were present no gross constriction of the spinal cord was found. Innes and Pillai (1955) investigated a lumbar paralysis of horses in Ceylon and reported damage to the spinal cord by cerebrospinal nematodiasis. Steel, Whittem and Hutchins (1959) gave an account of "wobbler" disease which they termed "equine sensory ataxia." They were unable to establish the cause but described 3 main types of lesion, (i) degenerative osteoarthropathy of cervical articular surfaces, (ii) degeneration and gliosis of the cord and (iii) subserous intestinal parasitic foci: they considered the first two types to be diagnostic. From this short review of the literature it would appear that ataxia is a common manifestation of "wobbler" disease and that the condition may result from several kinds of spinal cord lesion.

The lesion responsible for the present case was a venous angioma. It involved the small veins and capillaries of the dorsal and dorso-lateral areas of the cord and caused a malacia which as far as the authors are aware has not been previously described in the horse. The pathology is essentially the same as the abnormality in man described as an "angioma racemosum venosum" by Mason (1943) and as "subacute necrotic myelitis" by Foix and Alajouanine (1926) and by Greenfield and Turner (1939). Mason considers this condition to be the commonest vascular abnormality of the cord in man. It affects both the grey and white matter of the thoracic and lumbo-sacral segments, particularly the dorsal surfaces, and is often accompanied by a degeneration in the ascending tracts, especially in the ventro-lateral columns.

In attempting to correlate the clinical signs with the neuro-anatomical localisation of the lesion, in the present case, one is faced with the problem of the anatomy of the tracts in the spinal cord in the horse. Little is known concerning this subject as tract degeneration studies on the horse have not been reported. In the case under discussion there was damage to the grey matter and to the nerve roots, especially on the left side, at the level of C6 to 7 which would result in a lower motor neurone type of paralysis. In the horse the brachial plexus is composed of nerves from C6 to T2 (Sisson & Grossman, 1953) and so a lesion between C6 to 7 could account for this incomplete retraction and abduction of the left fore. Similarly, excessive protraction of the left fore could be related to a weakness of the flexors although there was no macroscopical evidence of muscle atrophy to support this.

If it is assumed that tracts in the dorsal columns

(*Concluded at foot of col.* 1, *p.* 613)

The Nutrition of the Ruminant*

BY

A. T. PHILLIPSON

The Rowett Research Institute, Bucksburn, Aberdeen

UNDER natural conditions ruminants are found in most parts of the world from the Arctic to the tropical regions. Among the marsupials of Australia the kangaroo and wallaby have developed several features which strongly suggest that their digestive and metabolic systems are akin to those of the ruminant (Moir, Somers & Waring, 1956).

The ruminant digestive system in which fermentation both precedes and succeeds digestion by enzymes in alimentary secretions therefore seems to possess some valuable properties as regards survival in different climatic conditions with widely varying vegetations. Perhaps the most striking variations are those found in tropical and sub-tropical climates where the rainfall is seasonal and periods of rapid growth and rapid maturity of herbage occurs followed by periods of drought when the herbage becomes fibrous and may have a low nitrogen content. The first and most important alimentary property of the ruminant is its ability to digest cellulose and other constituents of the fibrous parts of the plant which it can do to a greater extent than those animals that rely on the large intestine for fermentation. The second important property is the ability of bacteria of the rumen to assimilate nitrogen in a non-protein form, which in turn allows the animal to be less dependent upon an adequate supply of protein nitrogen in its food than animals with a simple stomach. The third important property is that the B vitamins are produced in the rumen as a result of the metabolism of the bacterial population in the rumen.

Factors Affecting Fibre Digestion and the Nitrogen Supply to the Rumen

The extent to which digestion of cellulose and allied constituents of plant fibres occurs is governed largely by the age of the plant and the degree of lignification of the plant fibre. The cellulose of young spring grass is highly digestible but in hays it may be reduced to 60 per cent. Similarly the digestibility of the fibre of straws is comparatively low compared to the fibre of grasses. Treatment of straws with 1·5 per cent. KOH for 24 hours improves digestibility of the residue from about 50 to 80 per cent. The nature of the association between cellulose, the hemicellulose fraction, which is largely made up of pentosan units, and lignin is not known, but whatever it is, treatment with dilute alkali seems to disrupt it and digestion of all the components is improved (McAnally, 1942). The time factor is also important in the digestion of fibre. Of the fibre passing to the abomasum of sheep fed on hay about 20 per cent. is still digestible if this is resuspended in the rumen in silk bags while about 12 per cent. of the fibre from the faeces is also digestible when this is tested in the same way. The problem of the ruminant feeding on dried-up coarse fibrous food is to obtain enough calories and nitrogen as the bulk of the non-digestible material is large in comparison to the quantity of material digested. Alkali treatment has never been popular and as the material so processed has to be washed with large quantities of water to free it of alkali it is obviously impracticable in arid areas of low rainfall.

The only thing that can be done to improve digestibility of low nitrogen fodders is to boost the nitrogen supply to the rumen. Coarse tropical fodders when dried up in the dry season may have a very low nitrogen content, certainly a great deal less than is needed for maintenance. Under these circumstances it seems possible that the microflora of the rumen is as starved of nitrogen as the animal itself. Lewis (1957) has shown that the urea content of the peripheral blood is roughly parallel to the ammonia nitrogen of the rumen contents. Also, Somers (1960) has found that the urea content of the saliva of the Merino sheep is related to the circulating concentration of urea in the blood. The relationship, however,

* This paper was delivered as a Peter Wilson Bequest Lecture at the Royal (Dick) School of Veterinary Studies on July 24th, 1960.

Ataxia in a Horse.—*Concluded.*

and in the "spino-cerebellar" region in the horse subserve proprioception, then in this case the ataxia and failure to retract the forelimbs when backed could be due to a failure of conscious proprioception and related to the dorsal column degeneration, although, if this is so, it is difficult to explain why the forelimbs were affected and not the hind limbs.

Acknowledgments.—This work was carried out with the aid of a Leverhulme Fellowship to one of us (A.C.P.). We wish to thank Dr. L. J. Rubinstein for advice and Miss J. Minns and Mr. H. D. Williamson for the photographs.

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is not a simple one. Thus the slow infusion of urea directly into the blood-stream of sheep feeding on a ration containing inadequate nitrogen increased the output of urea in the parotid saliva a great deal more than the same infusion given to sheep on an adequate nitrogen intake. In addition, rather less than 25 per cent. of the urea so infused was excreted in the urine of the sheep on the inadequate nitrogen ration while about 70 per cent. of the infused urea appeared in the urine of sheep fed on the adequate nitrogen ration. The Merino sheep therefore appears to have the ability of conserving urea nitrogen when in need of it. Under these circumstances the practice of supplementing low nitrogen fodders with urea appears to have a sound physiological basis. The difficulty is to add it in a way which does not cause dangerously high concentrations of ammonia in the rumen. As urea is hydrolysed in the rumen with the liberation of ammonia the final stage in the circulation of nitrogen depends upon how much ammonia nitrogen is assimilated by bacteria in the rumen and converted into bacterial protein. It is well known that the addition of starch to a high protein ration depresses the concentration of ammonia nitrogen in the rumen liquor. Comparison of the net change in ammonia of grass-fed sheep and sheep fed on a very rich flaked maize ration shows that with grass-fed sheep there was invariably a substantial increase in the quantity of ammonia after 4 hours incubation "*in vitro*" under CO_2 at 37° C. while with the flaked maize there was a loss or no change. With the latter ration the addition of ammonium chloride to the liquor is necessary to demonstrate the full capacity of the organisms concerned to assimilate ammonia nitrogen. Similar experiments with the rumen liquor of sheep in which different proportions of groundnut meal and the flaked maize ration were fed showed a gradation between the two results. The net changes represent the balance between the two processes concerned, namely the production of ammonia as a result of deamination of amino-acids, salivary urea and possibly of amides, and the assimilation of ammonia nitrogen: the final result indicates the relative speeds of the two processes.

The fact that ammonia nitrogen is actually incorporated in the bacterial protein when net losses occur can be demonstrated by the use of ammonium chloride enriched with ^{15}N.

Bacteria have been isolated from the rumen of sheep fed on flaked maize which ferment starch and glucose and assimilate ammonia nitrogen from the media. Some of the organisms so isolated were similar to *Lactobacillus bifidus*. These organisms produce lactic acid and acetic acid in the proportion of about 2 : 1 and the lactic acid is in the L+ form (Phillipson, Dobson & Blackburn, 1959). Many of the cocci of the rumen also assimilate ammonia nitrogen "*in vitro*" but the extent to which this occurs is reduced if they are grown in the presence of peptone although growth is heavier. There is evidence that certain cellulose-fermenting organisms assimilate ammonia nitrogen in a similar way: indeed, one strain, *Bacteroides succinogenes*, will not grow except in the presence of ammonia nitrogen (Bryant, Robinson & Chu, 1959).

When dietary nitrogen is low then the concentration of ammonia nitrogen in the rumen is also low. This influences the concentration of circulating urea and the content of urea in saliva, which are depressed. In addition to salivary recirculation urea can enter the rumen by diffusion from the blood-stream (Houpt, 1959). It is likely that this occurs along the whole length of the alimentary tract but it seems as if such a recirculation either *via* the saliva or by direct infusion can only be useful if the nitrogen concerned can be assimilated by micro-organisms before they are exposed to the proteolytic enzymes of the abomasum and small intestine. However, the fact that nitrogen does recirculate in this way and can be incorporated in bacterial nitrogen in the rumen may mean that sheep can survive longer under conditions of low nitrogen intake than animals in which a bacterial population is confined to the distal parts of the digestive tract. It must, however, be emphasised that there is nothing to be gained by supplementation of ruminant foodstuffs with urea when nitrogen supplies are adequate, as they usually are in this country, and its use should only be considered when conditions make it impossible to boost the nitrogen intake by small supplements of protein-rich meals or fodders.

The Rearing of Dairy Cows

One of the difficulties of feeding the high yielding dairy cow is to get enough digestible foodstuffs and roughage into her to provide for the milk yield of which she is capable. If the roughage of the ration is reduced to too low a proportion in order to give an adequate quantity of the high energy starch-rich foodstuffs then there is a danger that the butterfat of the milk may be reduced. This is because high starch feeding affects the proportions of fatty acids in the rumen, and increases the concentrations of propionic acid at the expense of acetic. Recently a large number of rations in cows have been examined at the National Institute for Research in Dairying at Shinfield and the effect of heavy concentrates feeding shows up clearly in the analytical figures for the proportions of fatty acids in the rumen. At the highest concentrations butterfat was depressed (Balch & Rowland, 1957). Attention to rearing, however, may be of some assistance here as the capacity of the rumen will be of some influence in determining the total quantity of food the animal can eat. The use of low planes of nutrition involving bulky fodders may increase not only the capacity of the rumen but also possibly the constitution of the animal for the better. The effects of nutrition, however, can only assist the inherent capacity of the animal.

Studies with identical twins that have been made in Sweden (Hansson, 1956) and by Crichton, Aitken and Boyne (1959 ; 1960a, b) at the Rowett Institute show clearly that the genetical capacity is as important as the feed and also, which is of even more interest, that the rearing of the young animal until it enters

the dairy herd has no lasting effect on its productivity per lactation but does appear to influence its useful lactating life in the dairy herd.

Hansson reared indentical twin pairs at varying levels of nutrition ; these levels were 60, 80, 120 and 140 per cent. of what is regarded in Sweden as the normal number of Scandinavian feed units per unit weight according to the formula $K.W^{5/8}$ (when K = a constant 0·071 and W = live weight in kg.). This resulted in the following proportional growth to 25 months of age : namely 329, 383, 446 and 462 kg. respectively. Controls reared at the 100 per cent. level of nutrition weighed 432 kg. The actual weight gains per unit of feed given were always in favour of the animals fed at the 60 per cent. level and decreased at the higher levels. The conclusion is drawn that the most effective production of growth is obtained from a relatively low intensity of feeding.

The final conclusion is even more interesting. The animals which entered the dairy herd were fed according to production. Some were culled for low production, leaving 9 pairs of twins. The low-plane twins appeared to have a longer milking life than the high-plane twins, although the small numbers observed leave doubt whether this observation is really true.

The procedure used by Crichton, Aitken and Boyne was as follows : the experiment was begun in 1949 using 18 pairs of one-egg and 6 pairs of two-egg twins. Four different rearing systems were compared which were : (1) a continuous high level of nutrition from birth to first calving (HH) ; (2) a high level of nutrition for the first 10 months followed by a low level until 2 months before calving (HL) ; (3) a continuous low level of nutrition until 2 months before calving (LL) ; and (4) a low level of nutrition for the first 10 months followed by a high level thereafter (LH). All groups were " steamed up " on a rising plane of nutrition from 2 months before calving. Subsequently all were fed in the same fashion.

During the first 10 months and subsequent winter period before first calving, feeding was strictly controlled. In order to simulate normal farming practice as closely as possible all animals over 10 months of age went to grazing in summer but the low-plane groups were confined to hill pasture while the high-plane groups were on good arable leys. The rations during the controlled feeding periods were based on standards published by Ragsdale (1934) of the daily intake of total digestible nutrients required by Ayrshire and Friesian cattle to obtain normal growth. During the high-plane phases of feeding the heifers were offered 110 per cent. of this standard while the low-plane animals were allowed only 70 per cent. for the first 6 months and 60 per cent. thereafter.

In spite of the fact that there was a difference of nearly 150 lb. bodyweight between the HH and LL animals when 44 weeks old there was no significant difference when they reached 260 weeks old, at their 3rd gestation. The height at the withers was the same at 182 weeks ; the width at the hocks at 260 weeks. Perhaps the most interesting measurement of all was that the onset of oestrus was different. There was nearly 100 days difference between the onset of the first oestrus between HH and LL animals and oestrus occurred when the standard measurements given above were of similar dimensions. There was a tendency for the LL measurements to be less than those of the other groups at the first oestrus but the difference was not statistically significant. The HL group took longest to reach sexual maturity. The reason for sexual maturity occurring when the animals were of about the same stature can only be explained by assuming that the production of gonadotrophin by the pituitary is linked inversely to the output of the growth factor.

After the first parturition growth continued in all measurements and maturity in the length of the back and the height of the withers occurred at about 5 years of age. Other measurements such as the width of the hocks and heart girth continued to increase slowly up to 9 years of age. As live weight also increased slowly there was no certainty that increase in the latter measurements was due to skeletal development. By 6 years all animals had attained approximately the same body size. Maturity in the LL group was delayed by about 9 months and in the HL and LH groups by about 5 and 4 months respectively.

At the third lactation there was no difference between the milk yields of the 4 groups of animals. Consequently the opinion that under-nutrition (so-called) in the early stages of development and early mating before the animal has reached 66 per cent. of its mature weight is bad practice seems to be quite unfounded. The LL animals have not remained stunted and their milk yield is as good as those that were reared on a high plane of nutrition. It is as yet premature to discuss the question of the useful life of these animals in the dairy herd and the total milk production of the 4 groups of animals as the full data are not yet available. From what is known, however, there seems reason to believe that the LL animals will produce more milk throughout their life in the dairy herd than their better reared twins. The final results of this long experiment are awaited with great interest.

A variation in the method of restricted rearing has been advocated recently, namely the practice of early weaning of calves. Under the system at present recommended calves are weaned abruptly when 3 to 5 weeks old. If hay and meals are available before weaning there is no advantage to be gained by weaning gradually since this is a nuisance from a managerial point of view and also means that calves delay taking solid food. Abrupt weaning causes them to become so hungry that they take to hay and meal feeding more rapidly. Sudden weaning causes an acute growth check but the animals recover from this and gain weight satisfactorily (Preston, 1957).

Calves weaned at 3 to 5 weeks of age on to a meal mixture with hay available certainly look in poor shape initially ; they are pot-bellied and have rough coats without lustre. Digestive upsets may occur such as bloat but taking it all in all they do get along surprisingly well. Aurofac has always been included

in the meal mixture and this seems to be important.

An example of the meal mixture used (Preston, 1956) is given below :

	Per cent.
Flaked maize	50
Bruised oats	19·5
Dried skim milk	10
Linseed cake meal	10
Fish meal	10
Syn. vitamins A and D	0·5
Aurofac	(5 lb. per ton)

This was used to compare abrupt weaning at 24 days with gradual weaning from 10 to 31 days. In the abrupt system, calves received 6 lb. whole milk daily until 24 days old ; the gradually weaned calves received 6 lb. whole milk until 10 days old, 5 lb. from 11 to 17 days of age ; 4 lb. from 18 to 24 days of age and 3 lb. from 25 to 31 days of age. The meal mixture was offered at 10 days old and was fed to appetite until the calves were eating 4 lb. per head per day. Hay was offered at 17 days old and water was always available.

The growth rates were satisfactory and there was a small difference in favour of the abrupt weaning (1·74 lb. meal per lb. gain) over gradual weaning (1·65 lb. meal per lb. gain) as regards total weight increase although this occurred at a slightly higher meal intake per lb. bodyweight increase. Since this experiment, Preston has abandoned all attempts at gradual weaning and his practice is to wean abruptly as a matter of course.

Antibiotics are included in the ration and these produce greater weight increases and utilisation of food. In addition they do appear to reduce the incidence of scours. This does not mean that scours do not still occur. The practice of feeding antibiotics as a routine has often been severely criticised on the grounds that by doing so resistant strains of coliform organisms are produced which will mean that any initial effect will wear off with time. During the 5 years in which this feeding practice for calves has been in use on the Duthie Farm of the Rowett Institute the incidence of scours does not seem to have increased and any fluctuations observed have been associated with the incidence of mastitis in the dairy herd rather than to the use of antibiotics in the calf food. The effect on food utilisation of including chlortetracycline* or oxytetracycline† in the ration appears to be due to a partial suppression of the fermentative processes within the rumen.

The mortality rate of calves generally in the country is regrettably high ; in fact one is tempted to think that calves are the worst treated animals on the farm. Undoubtedly troubles have arisen in early weaned calves but there seems no reason to suppose that it leads to a greater overall death rate. In spite of the weaning check, animals catch up again later on. The problem of calf mortality is a general one all over the country and does not seem specifically a result of any system of rearing. It remains to be seen how the system of early weaning affects the subsequent performance of the animals when they are in the dairy herd.

* Aureomycin. † Terramycin.

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REVISED U.S. PROPOSAL FOR THE USE OF MINERALS IN ANIMAL FEEDING-STUFFS

A revised Food and Drug Administration proposal for the safety clearance of 42 compounds serving as sources of minerals in animal feeds was announced recently in the United States. This action follows reconsideration by FDA of an earlier proposal, and it is based on the comments and additional data obtained from animal nutrition experts and the feed industry. The list includes compounds which are the sources of cobalt, copper, iodine, iron, manganese, and zinc.

Specific limits are proposed only for the addition of cobalt and copper to animal feeds. The other minerals are regarded as safe when used in accordance with good feeding practice to supply nutritional requirements, taking into account the mineral content of available feed and the environment in which the the animal is reared.

The new proposal would place a safe limit for added cobalt at no more than 1 part per million in the daily feed intake of non-ruminants, such as swine and poultry; and for added copper, at no more than 10 parts per million in the daily intake of sheep. The restriction on cobalt is based on the advice of consultants that a larger amount causes a condition known as polycythemia—an increase in number of red blood cells. The safe limit for copper rests on the observation that the normal growth of sheep on western ranges is inhibited with the addition of copper salts in excess of 10 parts per million of the ration.

Sixty days after publication in the Federal Register (July 9th) are allowed for all interested persons to make comments on this proposal. The views put forward will be considered by the Commissioner of Food and Drugs in the drafting of a final order.

Halothane* Anaesthesia in Small-animal Practice

BY

F. W. SIMS

Congleton, Cheshire

SUMMARY.—The use of halothane as a general anaesthetic is described in a series of 114 cases, 71 in dogs and 43 in cats. Reference is made to the induction of anaesthesia with this agent, and its special advantages in small-animal surgery are discussed.*

ALTHOUGH there are now about 200 publications on halothane, these are practically all concerned with its use in man. A few experimental papers report laboratory work in dogs, cats and monkeys, the most important being those of Raventos (1956), and Duncan and Raventos (1959). These deal with the fundamental pharmacological studies of halothane, most of which were carried out in dogs and cats. Dogs were anaesthetised with halothane for as long as 4 hours using standard "human" apparatus. Profound muscular relaxation, very limited capillary bleeding, and rapid, quiet recovery were noted.

Hall (1957) published an account of the use of halothane as the sole or principal anaesthetic agent in 100 surgical operations including 49 dogs and 6 cats, the remainder being farm animals. He, too, reported rapid, quiet recovery, and also smooth and rapid induction.

Fisher and Jennings (1958) record general anaesthesia in 17 horses and 50 cattle by means of halothane, their results indicating that it provides a safe and satisfactory method of inducing and maintaining general anaesthesia in those species when used in closed circuit. They note that, although a comparatively large volume of halothane was required for induction (30 c.c. for a cow compared with 37 c.c. for an hour's maintenance in the same animal), this method had the outstanding advantage of rapid reversibility throughout anaesthesia. Furthermore, with halothane induction and maintenance (as compared with induction with a barbiturate and maintenance only with halothane) the final recovery was rapid and the animal was usually up and feeding within 30 minutes to 1 hour.

Lumb (1959) of Michigan State University, describes the use of halothane in 142 anaesthetic periods in dogs. He concludes that it is a potent anaesthetic agent, producing satisfactory anaesthesia and muscles relaxation. Nausea and vomiting were not observed in any of the animals and recovery was usually rapid and quiet.

Ormrod (1960) has used halothane in a series of 13 cases selected as giving cause for anxiety regarding anaesthesia. He describes it as "a remarkably trouble-free anaesthetic agent," safe and easily given even to poor risk patients. He notes the high cost, although, as pointed out by Harrow (1960) and confirmed by the writer's experience, much of this was due to the very high flow-rates of oxygen that he used, with consequent wastage of halothane.

This present paper describes the experience of 114 consecutive cases in small animals in a country practice.

Premedication

Halothane very rarely produces vomiting and the writer has only seen 2 cases in this series. Excessive mucus secretion and salivation are also absent, so that no premedication is required in this regard.

Sedatives tend to prolong recovery, and sometimes produce post-anaesthetic vomiting. They are therefore best avoided.

Chlorpromazine, diethylthiambutene hydrochloride and pethidine have all been severally used by other workers, but the present author has not yet had the occasion to employ them. Relaxation was found to be adequate in all the cases and the use of relaxants appeared to be unnecessary.

As with other volatile anaesthetics, atropine may be used to protect the patient against over-stimulation of the vagus, but this has not been necessary in the writer's experience.

Anaesthetic Equipment

In this series of anaesthetic cases a standard Boyle machine,† which consists basically of a stand on which is mounted an oxygen cylinder, an oxygen flow-meter, and a vaporiser bottle, was used. Additional equipment which is useful but by no means essential, particularly with halothane, can comprise carbon dioxide and nitrous oxide cylinders with a flow-meter for each, and additional vaporiser bottles for ether, trichlorethylene, etc. An emergency oxygen supply by-passing the vaporiser bottles is sometimes useful. A re-breathing bag of up to 2 gallons capacity is a useful guide to the respiration of the patient during the course of the operation. A Waters carbon dioxide absorber is used for closed-circuit work, a technique which considerably reduces the amount of anaesthetic required. This technique is not difficult to acquire, once some experience of the agent has been gained in open or semi-closed circuit. The ether bottle provided with many anaesthetic machines should not be used with halothane since it tends to give very high vapour concentrations which may be dangerous. A standard "Fluothane" bottle is now marketed by Messrs. British Oxygen Gases and this we have found to be very satisfactory. Alternatively, a standard "Trilene" bottle may be used provided that the adjustable cowl is pulled up to its maximum extent and the level of the liquid halothane is kept below the opening of the "U" tube.

Whatever apparatus is used for vaporising halo-

* "Fluothane," I.C.I.

† Produced by Messrs. British Oxygen Gases.

thane, it should be connected to a very close-fitting face mask, and the writer has found that the one described by Hall (1957) is ideal. Being flexible, it can be moulded closely to the face, thus keeping dead-space to a minimum, and its conical shape enables it to be held very closely to the face during induction. For long operations in dogs the mask is removed after induction and a Magill endotracheal cuffed tube is substituted. This is used in connexion with Ayre's T-piece and Mapleson's System E (Hall, 1958) for small dogs.

Alternatively, particularly in larger dogs, a closed system with a Water's carbon dioxide absorber may be used, or a semi-closed system without absorption.

This latter is basically Mapleson's System A in that it comprises an expiratory valve close to the patient and a length of corrugated tubing at the distal end of which is a rebreathing bag and the inlet from the vaporiser. With this system no rebreathing is permitted. However, we have found that by partially closing the expiratory valve and allowing a degree of rebreathing, comparatively low gas-flow rates may be used (see Fig. 1).

Induction

"Sleep" doses of barbiturates such as thialbarbitone or thiopentone have been used by Hall, and by Lumb, and also by Fisher and Jennings, but the present author agrees with the latter that induction and maintenance of anaesthesia with halothane alone is in most cases preferable since in this way all the advantages of the drug are preserved. This is particularly applicable to small animals where the quantity of anaesthetic used is not high. An exception should perhaps be made in very robust, big dogs, in which it has been found that there may be a degree of narcotic excitement just prior to the stage of full surgical anaesthesia. This excitement calls for fairly vigorous restraint and the use of a large volume of halothane vapour. Excessively fat dogs also require a large quantity of halothane for induction, possibly because, as Duncan and Raventos have shown, the agent is more rapidly absorbed into the body fat than into the other tissues. On the other hand, dogs which are "toxic" take halothane very well.

The method adopted for induction with halothane in this series is first to apply the mask to the face unconnected to the machine to allow the animal to get used to it before the vapour is given. After a second or two, the tube is fitted to the mask and oxygen alone is given at a flow-rate of 2 to 3 litres per minute depending on the size of the animal. As the subject begins to breathe deeply, the next stage is to introduce the halothane vapour, first at low concentrations (mark 3 to mark 4 on the machine). Induction proceeds at this rate for about 3 minutes, by which time the subject is becoming drowsy. The writer has not seen any excitement at this stage. The lever is then moved over nearly to the "full open" position and induction proceeds. It is shortly after this that a variable degree of narcotic excitement sometimes occurs. It is in most cases only slight, and the patient makes a feeble attempt to remove the mask and may urinate and defaecate. This stage is not seen in the "toxic" or weak subject.

Narcosis now passes into anaesthesia, usually after a total time of about 8 minutes after applying the mask.

Maintenance

Once surgical anaesthesia has been achieved, the endotracheal tube may be inserted, and the author believes that this is far superior to the face mask for dogs since, because of the hair on the animal's face, the mask can never be really close-fitting and there must always be some escape of vapour.

The introduction of the tube is very easily performed in the dog by first inducing full relaxation with the mask. The head is then held in the normal "standing" position whilst an assistant opens the jaws to the full extent. The tongue is pulled well forward by one hand and the end of the tube, lubricated with an anaesthetic jelly, is placed over the epiglottis. The fore-finger of the other hand is then placed over the tip of the tube, pulling it and the epiglottis downwards and forwards towards the operator. This opens the epiglottis and enables the tube to be pushed under the finger-tip and down into the trachea.

By this method intubation is rapidly effected without using a laryngoscope.

In the cat intubation is more difficult owing to spasm of the vocal cords which, in the light of experience, can only be overcome by premedication with succinylcholine. Intubation was not used in the cats in the present series.

For maintenance, the oxygen flow-rate is adjusted according to the tension of the re-breathing bag, which should be kept about two-thirds full. Earlier in our series we used about 1.5 litres of oxygen per minute in cats and about 2 litres in dogs for maintenance in semi-closed circuit. Experience showed that this rate could be reduced to about 250 ml. in cats, using Hall's mask, and to 0.5 to 1 litre for dogs of average size using Magill's tube (see Fig. 1). In closed circuit the flow-rate is reduced to provide only the basal oxygen requirement of the patient.

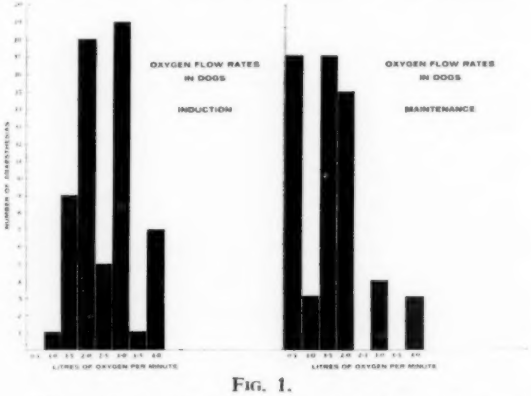

FIG. 1.

When using a fully closed circuit it is most important to remember that the rate of uptake of halothane by the patient falls off very rapidly soon after the stage of deep anaesthesia is reached. This means that

if the vapour flow is left at the concentration required for induction, there is a rapid build up of halothane in the circuit and this will produce the "alarming results" referred to by Ormrod. *For this reason the vapour concentration must be considerably reduced during the maintenance period* and in long operations the halothane supply can be cut off completely for short periods. Provided, however, that these facts are realised the closed circuit with carbon dioxide absorption is probably the best and most economical method of administering halothane.

It must always be remembered that the potency of halothane is twice that of chloroform and three times that of ether, and clinical assessment of the depth of anaesthesia is far more important and reliable than an exact knowledge of vapour concentration.

Short Operations in Cats

For very short operations in cats, such as the castration of adult males, or radiography, and whenever handling is difficult, a closed mask or jar may be used, the anaesthetic being carried on a small piece of cotton wool or gauze. We have found that up to 1 ml. is adequate for this purpose.

The cat is held in the usual way by the back of the neck in the left hand and the jar containing the anaesethetic is placed gently on the face. After a few seconds the animal will quietly raise a paw in an attempt to remove the mask, which is then lifted off the face for a few seconds and then replaced. After this the animal remains quiet and will pass into a stage of quite deep anaesthesia. The cat in no way appears to object to the halothane vapour and there is very little struggling or excitement. In the majority of cats this is altogether absent and in fact the wilder the animal the quieter seems to be its induction. For this reason it is very necessary closely to watch the patient's reactions, otherwise alarmingly deep anaesthesia may occur unobserved. This is particularly important in one's first few cases when the operator who is used to ether is expecting the cat to struggle. We have not had a subject which could not be anaesthetised single-handed by this method, and the following case illustrates its value.

A large, wild tomcat was brought in for castration, with a severe warning of its vicious temper. This was one of our first opportunities to use the drug and assistance was at that time assumed to be necessary. The cat was removed from its basket with great difficulty, and as soon as the mask was applied the assistant had to answer the telephone, leaving the operator single-handed. The cat went quietly to sleep and complete anaesthesia was achieved without any struggling whatsoever.

Herein lies one of the advantages of halothane; cats may be anaesthetised single-handed in their owners' homes, and at negligible cost.

Economics

Despite the apparently high price per bottle, the cost of halothane anaesthesia, particularly by closed circuit, is little higher than that of other methods. Figs. 2 and 3 show the amounts of halothane used in this series, the average being 7.5 ml. for dogs and 2.5 ml. for cats at a cost of 10½d. per ml. The majority of operations, however, cost less than this, and the average quantity of halothane used in 35 of the dogs was only 4 ml.

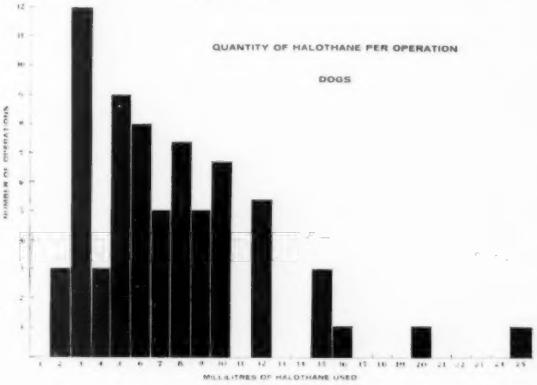

FIG. 2.

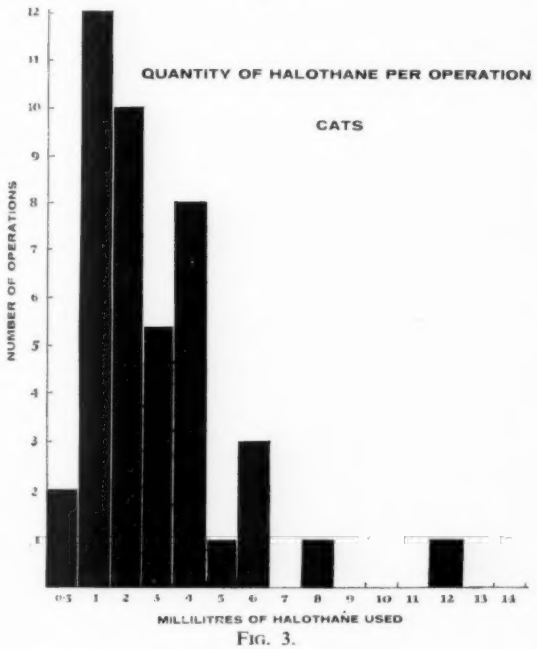

FIG. 3.

The majority of these operations were carried out in semi-closed circuit and the closed-circuit technique very much reduces the amount of halothane required.

The amount required for induction, of course, remains the same irrespective of the length of the operation so that the cost per unit of time for long operations is relatively lower than it is in short ones.

One apparently big item is the capital cost of the anaesthetic machine. Although more can be spent on extra fittings, a simple, reliable set of equipment may be purchased for about £50. This amount, which may be reasonably "written off" at less than £10 per year is very little in relation to the ease and safety of the method.

Clinical Assessment and Summary

Halothane has been used as an anaesthetic agent for 71 dogs and 43 cats varying in age from 2 months to 15 years and in condition from good health to very "toxic." The type of operations performed is given in Table I.

TABLE I

Operation	Dogs	Cats
Head and Neck		
Ears—haematoma; aural resection ...	3	-
Dental extraction, etc.	8	-
Extirpation of eye	2	-
Thorax		
Foreign body in lung	-	1
Abdomen		
Spaying	9	11
Enterotomy	4	-
Pyometra	2	-
Umbilical Hernia	-	2
Cystotomy	1	-
Orthopaedic		
Bone pinning	3	3
Dew claw amputation	6	-
Limb amputation	-	2
Removal of patella	1	-
General		
Castration	1	14
Tumours	16	1
Abscess treatment	3	4
Wound treatment	4	-
Manipulation, restraint, X-ray	8	5
Totals:	71	43

The author has used no other anaesthetic which has so many advantages as halothane from the points of view respectively of the veterinary surgeon, the owner, and the patient. Anaesthesia is safe, recovery is quick, and there are no unpleasant after-effects, a fact often disregarded in veterinary practice. The animal is able to return to its own surroundings in the shortest possible time and the owner is met by a completely co-ordinated, cheerful pet when he collects the animal shortly after the operation. During the operation itself the animal is well relaxed and resistant to shock, and the veterinary surgeon who is usually acting as anaesthetist as well as surgeon has only the effects of one drug to consider. The depth of anaesthesia can be varied rapidly and accurately by simple instructions to an assistant. Halothane produces profound muscular relaxation which is of great value in abdominal surgery and also in such operations as bone pinning where the extension of the limbs is very much facilitated. Although it is generally recognised that in light anaesthesia halothane is not a good analgesic, the writer has found in practice that it is highly effective in the deeper planes. This has been noted particularly in such operations as aural resection and extirpation of the eyeball.

It has been noticed that halothane produces marked relaxation of the anus during anaesthesia which may result in the voiding of faeces. However, this feature has the advantage of enabling perianal surgery to be performed easily. It was of great help in one case where a myoma was removed from the rectal wall, making possible digital manipulation of the growth *via* the relaxed anus. This relaxation is also useful for the operation for extirpation of the anal glands.

Halothane, being non-inflammable, can safely be used in surgery where the electrocautery is employed, and the risk of explosion due to static electricity or the presence of naked lights in the operating room is non-existent.

Cats can be anaesthetised single-handed with halothane with the minimum of restraint in the presence of their owners and in their own homes.

A possible disadvantage, particularly in the dog, is the time taken to induce anaesthesia. This is considerably longer than with single intravenous agents, and the drug is perhaps not one for the "man in a hurry." It is also necessary to have adequate apparatus for administering it, but this is not unduly expensive and it has been found that the cost is, in fact, soon recovered.

Acknowledgments.—My sincere thanks are due to my assistant, Mr. Keith Lea, B.V.SC., M.R.C.V.S., for very considerable help in all stages of this work; also to the Pharmaceuticals Division of Imperial Chemical Industries Limited for supplies of "Fluothane."

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FERTILISERS AND FEEDING-STUFFS REGULATIONS, 1960

New Regulations come into operation on October 1st, 1960. They incorporate revised methods of analysis and certificates of analysis of fertilisers and feeding-stuffs as recommended by the Standing Advisory Committee appointed under the Fertilisers and Feeding Stuffs Act, 1926. The new Regulations, entitled Fertilisers and Feeding Stuffs Regulations, 1960, have been made under Section 23 of the Fertilisers and Feeding Stuffs Act, 1926, and replace the current Regulations made in 1955 and 1956. Copies are obtainable from H.M.S.O., or any bookseller, price 2s. 6d. net (by post 2s. 10d.).

Enquiries regarding the Regulations should be addressed to the Ministry of Agriculture, Fisheries and Food, Grassland and Crop Improvement Division, Whitehall Place (East Block), London, S.W.1, or to the Department of Agriculture and Fisheries for Scotland, St. Andrew's House, Edinburgh, 1.

Current Literature

ABSTRACTS

Parathion Poisoning from Contaminated Barley. Kanagaratnam, K., Wong Hock Boon, and Tan Kwang Hoh. (1960). *Lancet*. **28.** 538.

With the increasing use of toxic organo-phosphate compounds as agricultural insecticides the recognition of the toxic symptoms and knowledge of the correct antidotes becomes increasingly important. Organo-phosphates inactivate cholinesterase with resulting accumulation of acetylcholine which causes the toxic symptoms. In September, 1959 an explosive outbreak of poisoning from barley contaminated with *Parathion* (one of the organo-phosphate insecticides) occurred in Singapore ; in all 35 children and 3 adults were affected ; 9 children died. In those with severe symptoms the commonest initial sign was sudden collapse followed in a few seconds by deep coma with dyspnoea, sweating, and frothing in the mouth. Those with mild symptoms usually experienced abdominal discomfort accompanied by, vomiting or diarrhoea and later headache, giddiness and malaise.

When it was realised the symptoms could be due to organo-phosphate poisoning atropine was given. Successive doses were given in some patients, the intervals between doses varying from 15 minutes to a few hours. Pyridine-2-aldoxime methiodide (P.A.M.) was not given as these drugs were not available in Singapore at the time.

It was established that barley was the most probable vehicle by which the poison was being transmitted. Warnings of " barley-poisoning " were then issued and only one more case was notified thereafter. Traced back to the shops, bags of barley were obtained which, on analysis, showed varying concentrations of parathion. Widespread distribution of contaminated bags in 3 towns established that contamination could not have occurred at local retailers or wholesalers. Contamination could only have occurred at a central source. Parathion was not then available in Singapore. Contamination appeared to have taken place prior to the arrival of the barley from Western Europe. As considerable time had elapsed between the import of the barley and the occurrence of cases it was not possible to establish the point of contamination and so its precise source.

The affected consignment and another suspect consignment were traced throughout Singapore, Malaya, and Borneo, and were destroyed.

Bacterial Flora of the Small Intestine in Acute Intestinal Obstruction. Bishop, Ruth F., and Allcock, E. A. (1960). *Brit. med. J.* **46.** 766.

In acute obstruction of the small intestine the bowel above the site of obstruction soon becomes filled with fluid which comes to resemble faeces both in colour and in odour. It has usually been assumed that the flora of this fluid is closely akin to that of normal faeces. It has generally been believed that the small intestine is inoculated with organisms by retrograde spread from the large bowel.

In this work samples of intestinal content were taken at operation from many levels of the small bowel by aspiration of its content through hypodermic punctures of the bowel wall. The results show that the small intestine above an obstruction contains a profuse flora of faecal type. This is abnormal. In contrast, the small intestine below the obstruction is either sterile or yields only a scanty growth. This leads to the conclusion that the profuse flora of the faecal type present above an obstruction of the small intestine is acquired by ingestion.

Details are given of 27 patients with acute intestinal obstruction from whom the material mentioned was obtained.

Relative Antibacterial Activity of Three Penicillins. Garrod, L. P. (1960). *Brit. med. J.* **45.** 527.

A new oral penicillin, the potassium salt of 6-(alpha-phenoxypropionamido) penicillanic acid, has recently been marketed in this country under the name *Broxil*. The only published information about it relates to its absorption which is claimed to be much more nearly complete than that of phenoxymethylpenicillin and equivalent to those produced by an intramuscular injection of the same dose of benzylpenicillin. Some information suggested a superior action against penicillin-resistant staphylococci apparently owing to its slower inactivation by penicillinase.

The plate-dilution method with a dilute inoculum was used to test the activity of the 3 penicillins against various organisms. The findings obtained against *Staph. pyogenes* were uniform with all forms of penicillin and there was never more than a difference of one tube between them for any one strain. One strain was most sensitive to G. (benzylpenicillin); 12 were most sensitive to V. (phenoxymethylpenicillin) ; 2 were more sensitive to V and G than to B (the new penicillin *Broxil*), while 11 were equally sensitive to all 3. The order of activity against penicillin-resistant staphylococci, in a form of a test which measures resistance to penicillinase, is B> V> G with wide differences. The order against streptococci and pneumococci is G> V> B with only small differences. The order against *H. influenzae* and *Proteus* is also G> V> B with considerable differences between G and the other 2. G.F.B.

Prevention of White Muscle Disease in Lambs by Oral and Subcutaneous Administration of Selenium. Kuttler, Kenneth L., and Marble, Donald W. (1960). *Amer. J. Vet. Res.* **21.** 437.

Evidence is presented to suggest that lambs are protected from white muscle disease if their dams are given subcutaneous injections of barium selenite during pregnancy. In the experiment described, a single injection of 0·05 g. $Ba\,Sc0_4$ per 100 lb. bodyweight given to the ewe 3 to 10 weeks before parturition appeared to be satisfactory.

Sodium selenite at a dose rate of 0·075 gm. per 100 lb. bodyweight caused death, but barium selenite produced no symptoms when given at the rate of 0·80 g. per 100 lb. bodyweight.

News and Comment

INTENSIVE REARING OF CALVES FOR VEAL

At a meeting of the Council of the British Veterinary Association on Friday, July 22nd, the Chairman of the Technical Development Committee, Mr. J. B. White of Salisbury, reported on the B.V.A. enquiry into the whole system of rearing calves for veal. Mr. White said that he and the Chairman of the State Veterinary Medicine Committee, Mr. G. Atkinson, together with Mr. S. L. Hignett (President of the B.V.A.) and Mr. John Anderson (Secretary), had visited several establishments in the south of England. Their general conclusion was that since the best conditions, from the veterinary point of view, appeared to be producing the healthiest calves, there was no economic justification for bad conditions and, consequently, for cruelty; in fact, in the great majority of establishments visited they had found conditions generally good.

The President also reported on a visit he had made to Holland with Mr. F. F. A. Burden, Member of Parliament for Gillingham and Chairman of the Animal Welfare Group in the House of Commons. They had visited two experimental stations and several commercial farms, and had discussed methods of rearing with the President, Secretary and other members of the Netherlands Veterinary Association. They were satisfied that the system of intensive rearing did not involve cruelty, with two possible reservations: firstly, they felt that restraint by means of solid-walled boxes was to be deprecated and, secondly, they were not satisfied as to either the necessity or the humanitarian justification for keeping calves in darkness.

After some discussion the following resolution was adopted by Council:—

> "That intensive methods of rearing calves for veal are not inhumane where carried out under suitable conditions of feeding and housing. Certain procedures, however, are undesirable, such as total darkness and very close confinement in boxes, and do not appear to be essential to the production of white veal. It would appear that, as in all intensive stock farming methods, the system is open to grave abuse by human neglect and failure. From the disease control aspect, a properly conducted system should not produce any special difficulties."

A full report on this matter will appear in an early issue of THE VETERINARY RECORD.

THE TERCENTENARY EXHIBITION OF THE ROYAL SOCIETY

As part of their Tercentenary celebrations, the Royal Society have given an exhibition this week, in the Diploma Galleries of the Royal Academy of Arts, illustrating some aspects of the current work of Fellows and their colleagues. The exhibits occupied 3 large rooms, and it will only be possible to indicate in briefest outline what they were about, particularly in the case of those dealing with what the Society would consider "A" subjects. On this side, there were exhibits dealing with: calculating machines; the physics of the earth, ocean, and atmosphere; exploration by radio-radio astronomy (here there was a model of the 250-foot Jodrell Bank radio telescope), and ionosphere; fundamental particles (it was interesting to see C. T. R. Wilson's original cloud-track apparatus of 1912, on loan from the Cavendish Laboratory); solvent extraction of plutonium; methods of refined chemical analysis—chromatography, ion exchange, the electronic structure of metals.

On the "B" side (with which subjects your correspondent felt more at home), there were exhibits dealing with the following: (1) The molecular structure of biological systems. This was concerned with the increasing knowledge of biological structure on the molecular and atomic scale being obtained particularly by X-ray analysis and by electron microscopy. There were illustrated recent advances in connexion with the structure of myoglobin and haemoglobin, with nucleic acid, with the architecture of viruses, and with the mechanism of muscular contraction in relation to structure. There was a striking electron microscope picture of the T.2 bacteriophage of *E. coli*, at a magnification of $\times$ 700,000. (2) Abnormal human haemoglobins, and abnormal human chromosomes. (3) Natural selection. One striking part of this exhibit dealt with "natural selection in action"—the rise of industrial melanism in moths, where dark forms, which are hidden on backgrounds polluted by industrial grime, increase, due to selective predation of birds, at the expense of lighter forms. (4) Microbial genetics. This exhibit dealt with the methods of microbial genetics, and with their application to the study of the genetics of enzyme formation, to modes of sexual reproduction in bacteria, and to a study of the parasexual cycle in fungi. (5) Antibiotics. This exhibit dealt partly with the general way in which an antibiotic is brought into practical use after its accidental or designed discovery, and also with recent work on the biosynthesis and mode of action of antibiotics. (6) Vitamins. One part of the exhibit dealt with vitamin B_{12} (a molecular model of which was shown), and there was direct veterinary interest in the exhibit concerning the use of "cobalt bullets" to provide sheep in cobalt-deficient areas with a lifetime supply. These "bullets," made heavy by iron, lodge and remain in the rumen, and are kept clean from surface contamination (which decreases their usefulness) by an accompanying steel grinder (an engineer's grub screw). (7) Electrophysiology. Here, experiments dealt with the electric activity of motor end-plates in frog muscle, and with the nerve impulse in the giant nerve fibres of the squid—a micro-syringe, essentially a very fine Pasteur pipette, being used to inject material directly into the fibre. Electric discharges from electric fish were demonstrated. (8) Physiological and biochemical aspects of plant growth. There were displays concerning the techniques of the study of the effects of light intensity and quality on excised root tip growth; the β-oxidation of fatty acids in plants; and

some of the responses of plants to giberellins. Several giberellins have been isolated, from plants, which are chemically and physiologically similar to the giberellins first known as fungal metabolic products which had remarkable effects on plant growth. This has led to the concept of the existence of natural plant hormones.

On Monday morning, when your correspondent was privileged to visit the exhibition, the Galleries were packed with an enthusiastic crowd, chiefly consisting, it seemed, of young men on the threshold of a scientific career. The exhibits were in no sense "written down" to a non-scientific audience, yet one had the impression that "DNA" was as familiar to these people as "H_2O" was to their fathers. Scientific research is producing results at an ever-increasing pace, and, since Fellows of the Royal Society will presumably always be at the really important growing-edges of research, the imagination reels when one tries to guess what the *next* centenary exhibition will be about. That the enthusiasm of the visitors will be great, can, however, be safely, predicted.

THE FIRST INTERNATIONAL CONFERENCE ON CONGENITAL MALFORMATIONS

Last week London was chosen as the venue of the 1st International Conference on Congenital Abnormalities organised by the International Medical Congress Limited, sessions being held from Monday onwards in Church House, Westminster.

Twenty-five countries registered delegates with strong representations from the United Kingdom and the United States of America. Some 30 papers were presented during the week on all aspects of the problem and stimulating discussion took place.

On Tuesday, Dr. Rhodes of the University of Toronto suggested that the veterinary surgeon might well make some contribution in the field of virus infections and the part they play in causing congenital abnormalities. The dangers of using live virus for immunisation against swine fever and blue tongue could not be overlooked as possible causes of malformation.

Dr. Court Brown of Edinburgh gave a stimulating paper on sex chromosome abnormalities, a field of study which might well be enlarged in the animal field.

In the session devoted to maternal foetal interaction, Dr. R. R. A. Coombs, M.R.C.V.S., Assistant Director of Research in the Department of Pathology at the University of Cambridge, contributed as a panel member in discussion.

A conference of this type may well act as a stimulus to our profession to take a serious interest in the continued collection of data from our population of domestic animals, realising the economic importance of certain abnormalities already recorded.

FIRST INTERNATIONAL CONGRESS ON MEDICAL PHOTOGRAPHY AND CINEMATOGRAPHY

We have received details of the 1st International Congress on Medical Photography and Cinematography which is to be held in Dusseldorf from September 27th to 30th. The congress is organised by Deutsche Geselschaft für Photographie e.V., Cologne, to whom all inquiries should be addressed. The preliminary programme includes two lectures specifically concerned with veterinary medicine—E. Becker, of Germany, "Uber die Anwendung photographischer und kinematographischer Techniken in der Tiermedezin" and H. Schebitz, also of Germany, 'Technik der Tierröntgenologie."

THE IVth INTERNATIONAL CONGRESS ON ANIMAL REPRODUCTION

The IVth International Congress on Animal Reproduction will be held at The Hague from June 5th to 9th, 1961. The main activities of the Congress will take place at Scheveningen, the internationally famed sea-side resort of The Hague, and the Congress will be under the patronage of His Royal Highness the Prince of the Netherlands.

The initiative for this Congress has been taken by the Standing Committee under the presidency of Professor Nils Lagerlöf, Stockholm. This Standing Committee has been set up to maintain international contact in the domain of physiology and pathology of animal reproduction, including artificial insemination.

It is one in the series of very important and successful congresses held in Milan (1948), Copenhagen (1952) and Cambridge (1956).

Plenary Sessions

In the morning sessions, prominent scientists will deal with a number of topical subjects of importance for research and working practice. The subjects provisionally selected are: artificial insemination in pigs; infection and infertility, biochemistry of the ovum and spermatozoa; the influence of the prenatal environment on the foetus in poultry and mammals; experience with mass examination of bulls for fertility, reproduction as a function of breed and environment.

Sectional Meetings

Sectional meetings will be held in the afternoons. The division into sections will probably be the same as at the previous congresses (physiology, pathology, artificial insemination). The first sectional reports have already been received.

Films and Demonstrations

Facilities will be provided for the showing of scientific films, and research workers will be afforded the opportunity of giving technical demonstrations.

Exhibition

During the Congress an exhibition will be held in the vicinity of the meeting rooms and will be open during the working sessions. Admission to the exhibition is for congress members only.

Sending in of Reports

Contributions to the congress in the form of introductions on animal reproduction, will be thankfully received. Those willing to give such introductions are requested to notify the Congress Secretariat accordingly before or by October 31st, 1960, at the latest, by means of an application form, whereupon they will be informed regarding the conditions which

such contributions should fulfil. Reports should reach the Secretariat not later than January 15th, 1961.

Papers

The preliminary reports for the Congress will, if possible, be sent to members in printed form some time before the Congress begins. If this should not be possible they will be available at the Congress.

Official Languages

The official languages of the Congress will be English, French and German. A simultaneous translation system will be used during the working sessions.

Fees

Registration fee for members Dfl. 100.—, for accompanying persons Dfl. 40.—.

The charge for the excursion, the farewell party and the Ladies' Programme will be specified in the provisional programme.

Accommodation

In order that the Secretariat may have an idea of the number of members and of hotel rooms needed, readers are requested to complete a provisional application form as soon as possible.

This provisional application does not place members under obligation.

In November the provisional programme, together with the definite application and accommodation forms, will be forwarded.

Excursions and Reception

During the Congress an official reception will be held. In addition, on one day a choice will be given between several excursions to places of interest in the field of animal reproduction. These trips will pass through typical Dutch polder landscape, historic towns, etc.

Ladies' Programme

The Ladies' Hospitality Committee, "Den Haag Ontvangt" (a permanent committee created for the entertainment of ladies from other countries staying in The Hague), have drawn up the programme, for ladies who are accompanying members of the Congress in order that their visit to the Netherlands may be as enjoyable and interesting as possible.

Secretariat

Application forms are available from the Secretariat of the IVth International Congress on Animal Reproduction at 14, Burgemeester de Monchyplein, The Hague (Netherlands).

BRITISH VETERINARY POULTRY ASSOCIATION

The summer meeting of the Association was held on July 12th and 13th at the Houghton Poultry Research Station by kind invitation of the Director, Dr. R. F. Gordon.

At the annual general meeting, the President, Dr. J. E. Wilson, occupied the chair and 45 members were present; there were 11 apologies for absence. The following were elected office bearers for the year 1960-61:—

President, Dr. W. P. Blount;
Vice-President, Mr. J. D. Blaxland;
Secretary, Mr. J. M. S. Lucas;
Treasurer, Mr. R. H. Axworthy;
Committee, Dr. J. E. Wilson, Dr. R. F. Gordon and Mr. W. E. Beattie.

Following the business meeting, members were entertained by the Station to a sherry party, and afterwards to dinner as the guests of Pfizer Ltd.

On the second day 6 papers were read by members of the Houghton Poultry Research Station staff on their current research work in avian diseases and avian physiology. After this members were able to visit demonstrations in the laboratories and animal houses.

APPOINTMENT OF COMMITTEE OF INQUIRY INTO FOWL PEST

In answer to a question asked by Sir Anthony Hurd, M.P., the Minister of Agriculture, Fisheries and Food announced in the House of Commons on Tuesday, July 19th, that the membership of the Committee which he and the Secretary of State for Scotland have decided to appoint will be as follows:—

Professor Sir Arnold Plant, B.SC. (ECON.), B.COM. (Chairman); S. R. Allsopp, Esq, C.B.E., D.L.; T. A. E. Layborn, Esq., C.B.E., F.C.I.B., F.I.G.M.; John Mackie, Esq., M.P.; Professor Kenneth Mather, C.B.E., D.SC., F.R.S.; Sir Richard Nugent, Bt., M.P.; Professor Alexander Robertson, M.A., B.SC., PH.D., M.R.C.V.S., F.R.I.C., F.R.S.E.; and Professor Cyril Tyler, D.SC., PH.D., F.R.I.C.

The Secretary of the Committee will be Mr. R. A. Isaacson of the Ministry of Agriculture, Fisheries and Food, the Assistant Secretary will be Mr. J. N. Coates, and Mr. A. C. L. Brown, M.R.C.V.S., will be Veterinary Assessor.

The full terms of reference for the Committee are:—

"To review the policy and arrangements for dealing with fowl pest in Great Britain, and to advise whether any changes should be made in the light of the growth of the poultry industry, present scientific knowledge and technical and administrative experience gained in recent years in this and other countries."

UNIVERSITY NEWS

London

Veterinary Pre-clinical Examination, Part II
June, 1960
PASS LIST

Broberg, John Oliver; Chooi Ah Chye; Crossman, Paul John; Davies, James Hugh; Hooper, Robert Stanley; James, John Albert; Kenyon, Christopher John; McGovern, Peter Thomas; Parsons, Anthony John; Pemble, John Michael; Rowson, Frank Hilton; Staton, James Frederick; Tyzack, Jennifer Mary; White, David John; Williams, Russell Michael.

Professor T. J. Bosworth, on his retirement from the professorship of Veterinary Pathology at the Royal Veterinary College, has been made Professor Emeritus of Veterinary Pathology in the University of London.

HENRY EUSTACE CROSS, M.R.C.V.S., D.V.H.

The notice recording the death of Captain Henry Eustace Cross may excite little comment from the modern generation but to those who are of more mature years it will bring back memories of the Indian Veterinary Service, the elite of all the dominion and colonial services.

Henry Cross commenced his veterinary career at the New College in Edinburgh, but he was one of the students who went with Professor Williams to Liverpool when the school was established in that city. He qualified in 1904 and was one of the first to take the diploma in veterinary hygiene (D.V.H.). Sir Rupert Boyce, one of the founders of the Liverpool school, was deeply interested in the development of veterinary science for he recognised its important position in the spheres of medical and biological endeavour. He took note of two students, H. E. Cross and R. E. Montgomery and under his influence they were "groomed" for a career in veterinary research.

In due time they were appointed to the Indian Veterinary Service and posted to the Imperial Bacteriological Laboratory at Mukteswar which was designed primarily to serve India and Burma as a place for veterinary research and for serum and vaccine production. Subsequently these products were in demand in far eastern countries, in Egypt, and in the East African colonies.

The buildings at Mukteswar were magnificent for their time; the Director was Col. J. Holmes. The research staff and the technical staff were small; too small, for the place was so top-heavy that the buildings overshadowed the few research workers. Montgomery looked for more fruitful fields and was appointed to the Sleeping Sickness Commission in East Africa, remaining in that area until he was appointed to be the first full-time Veterinary Advisor to the Colonial Office. Cross remained at Mukteswar until 1913 when he was appointed to succeed A. S. Leese as camel specialist; this was a civil appointment but it was concerned with the Camel Corps of the Indian Army. The camels were used for baggage only.

In those days the Army Veterinary Corps had only a slender connexion with the Indian Army; the various mounted and other troops depended upon Indians some of whom were trained at the Punjab College and some who were trained in the Army and went by the name "Salutri"; most of these latter men were very competent and they served under the direct control of the O.C. of the unit. The Army Veterinary Corps came into the picture in special circumstances such as when serious contagious and infectious diseases required attention.

In spite of his schooling Cross was not a bench worker; his active mind and spirit required a broader field and wider contacts. He was much happier with the camels. He took a great interest in entomology and whilst at work in the field he published several papers on this subject. One parasite, a hypodermal parasite of goats, bears his name (*Hypoderma crossii*). It was not long before he was a competent camel master; moreover, the appointment enabled him to indulge more in the equine field particularly with regard to racing. Whilst holding this appointment he carried out a considerable amount of research work concerning the transmission of the vectors of the causative agent of surra and found time to write a book on the camel and its troubles which was not of great academic merit but served its purpose well and in the World War I, which loomed ahead, became a *vade-mecum* to many tyros who were put in charge of camels.

In 1917 Mrs. Cross became seriously ill and had to go to Britain for medical treatment; Cross was given leave to accompany her and the camel job was taken over by the military authorities. Captain W. A. Pool was appointed to relieve Cross.

Soon after his arrival in England Cross was appointed temporarily to the A.V.C. and served for a time in Palestine, returning to his civil post in the Punjab in 1920. He retired from I.V.S. in the late 1920's and returned to England where he purchased a small property at Goff's Oak in Hertfordshire and was able to indulge in hobbies very dear to his heart, the keeping and breeding of a few Thoroughbreds and greyhounds. He achieved some success with his horses at Northolt, then a centre for pony racing, and with his hounds on the coursing field and the new greyhound tracks. About 1930, on the recommendation of Sir Frederick Hobday, Cross was appointed head of the Cairo Veterinary School, a job for which he was particularly suited. Each year during the Egyptian long vacation he spent several months in England and he was able to supervise and continue with his racing and greyhound interests. He re-organised the Cairo School and shortly before World War II he was able to hand over an efficient going concern to his Egyptian successors.

He returned to live permanently at Goff's Oak but, to his sorrow, increasing age and the war compelled him gradually to relinquish his horse and greyhound activities. He and Mrs. Cross lived quietly at Lucas House tending their beautiful garden and entertaining the many friends who called to see them; it was always a pleasure to call and see them, for he was a good host, and his reminiscent accounts of racing in India, Egypt, and England, and of his experiences with his camels and greyhounds were delightful and most entertaining. His knowledge of pedigrees and all aspects of breeding was prodigious. He was of the old school, one who kept his eye on the practical ball, and I think that his academic knowledge, in which he kept surprisingly up to date, was valued only in relation to its useful application. He kept in fair health and good spirits until quite near the end.

RICHARD FAIRCLOUGH, B.Sc., M.R.C.V.S.

W. B. S. writes:—

To all who knew Roy Fairclough the news of his death in a London hospital on July 21st will have been received with the deepest regret. Those of us who knew him well at the Royal (Dick) College and afterwards were aware that he suffered from a serious heart condition which restricted his life to an increasing extent.

As time passed, Roy gradually relinquished vet-

erinary practice and devoted more and more time to his farm at St. Michael's-on-Wyre which flourished under his care. His approach to farming methods was most progressive and he introduced many outstanding developments in farm building which were adopted by others locally. For many years he owned a very successful pedigree Jersey herd and was Secretary of the Lancashire Jersey Society. He took a great interest in local affairs and was everyone's friend. An active Freemason, he was a past Worshipful Master of Garstang Lodge and a Member of the Rose Croix Chapter.

Recently he was forced to abandon many activities, even golf and bowls, both of which he played with skill and enthusiasm. Such restrictions would have depressed most men but Roy possessed a delightful sense of humour which helped him through all his difficulties.

Advances in cardiac surgery gave him new hope and he resolutely prepared himself for what he knew to be one of the most major of all operations with his characteristic spirit. Tragically the operation was not successful, and a friend has been lost who was valued greatly for his sincerity, loyalty and courage. Men of the calibre of Roy Fairclough are rare indeed and it is a privilege to have been his friend.

Our deepest sympathy goes to his devoted wife Mary, his son and daughter, and to his parents at this time.

THE REGISTER OF VETERINARY SURGEONS

Mr. Philip Thomas Kelynack, B.V.SC. (MELBOURNE), of 185, Whitehorse Road, Deepdene, Melbourne, Victoria, Australia, was admitted on July 20th, 1960, to the Commonwealth List of the Register of Veterinary Surgeons.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

FAIRCLOUGH, Richard Rowland, Ivy Dene, St. Michael's-on-Wyre, Preston, Lancs. Graduated Edinburgh, July 12th, 1945. Died July 21st, 1960.

PERSONAL

Engagement

CHAPMAN—BROWN.—The engagement is announced between Richard Hereward Chapman, B.V.SC., M.R.C.V.S., only son of Mr. and Mrs. H. V. Chapman of High Halden, Kent, and Susan Jane Brown, only daughter of Group Captain and Mrs. J. A. S. Brown of Frittenden, Kent.

Births

CALDWELL.—On July 14th, 1960, to Betty, wife of Ben A. W. Caldwell, B.V.SC., M.R.C.V.S., of "Westlands Lodge," Swinton, Manchester, a daughter, Michelene Jane.

MACPHERSON.—At Leanchoil Hospital, Forres, on July 12th, 1960, to Margaret, wife of Alasdair MacPherson, B.V.M.S., of 3, Bank Lane, Forres, a son.

PAYNE.—On June 27th, 1960, to Dinah, wife of L. N. Payne, B.V.SC., M.R.C.V.S., of Langford House, Langford, Bristol, a son, Julian Christopher.

WATERWORTH.—On Sunday, July 10th, 1960, at the City Maternity Hospital, Carlisle, to Hazel (*née* Mears), B.V.SC., M.R.C.V.S., and Jim Waterworth, B.V.SC., M.R.C.V.S., of 24, Norfolk Road, Carlisle, a daughter, Helen Deborah.

COMING EVENTS

August 28th to September 3rd. 78th Annual Congress of the British Veterinary Association in Glasgow.

September

21st (Wed.). Joint Meeting of the North Wales Division with local Branches of the British Medical Association for a Symposium on Brucellosis at the Imperial Hotel, Llandudno, 2 p.m.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Lanarks. Hawksland Farm, Lesmahagow (July 20).

Fowl Pest

Lincs. Home Farm, Easton, Grantham (July 23).
Norfolk. Chalk Hall Farm, Hockwold, Thetford (July 19).
Salop. Ivy House, Brockton, Lydbury North (July 20).
Staffs. 60, Ounsdale Road, Wombourne, Wolverhampton (July 19).
Suffolk. Warehouses, Fornham Road, Bury St. Edmunds (July 20); Dell Cottage, Thurston, Bury St. Edmunds (July 21); 2, School Lane, Elmswell, Bury St. Edmunds (July 23); Layham Hall, Ipswich; Holly Lodge Farm, Upper Layham, Ipswich (July 24); 66, Hallow Road, Bury St. Edmunds (July 25).

Swine Fever

Ches. Dawfields Farm, Sproston (July 22).
Derbys. Sutherland Farm, Oxcroft Lane, Bolsover, Chesterfield (July 21).
Devon. H.M. Dartmoor Prison Farm, Princeton, Yelverton (July 20).
Essex. Franks Farm, St. Mary's Lane, Cranham, Upminster (July 19).
Flints. Hill Farm, Penley (July 21); Coleshill, Flint (July 22).)
Gloucs. Ellercote Cottage, Itchington, Alveston (July 20).
Hereford. Westfields, Eaton Bishop (July 21).
Lancs. Meadowcroft Farm, Medlock Road, Woodhouses, Failsworth, Manchester; Wayside Farm, Back Lane, Goosnargh, Preston (July 20).
Lincs. Devonport Farm, Helpringham Fen, Sleaford (July 22); 29, Northorpe, Bourne (July 25).
London. Piggeries rear of Manor Park, S.E.13 (July 22).
Montgomery. Red House Farm, Bettws, Newtown (July 25).
Norfolk. Manor Farm, Filby, Great Yarmouth; Springfields Farm, Bradwell, Gt. Yarmouth (July 19); Hall Farm, Thurlton, Norwich (July 21).
Suffolk. Pound Farm, Thelnetham, Bury St. Edmunds (July 19); Danehill Farm, Kennett, Newmarket (July 25).

ADVERTISER'S ANNOUNCEMENT

SMITH & NEPHEW PHARMACEUTICALS LTD. announce the introduction of Narphen veterinary brand phenazocine hydrobromide, a new synthetic analgesic more powerful than morphine or pethidene.

Narphen may be administered intravenously or intramuscularly in the dog, to produce analgesia, without the side-effects often attendant upon the use of morphine.

Narphen is subject to the Dangerous Drugs Regulations and is available in ampoules containing 2 mg. phenazocine hydrobromide per ml. aqueous solution in boxes of 10 and 100 1.1-ml. ampoules.

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Vaccination of Cattle with S.19

Sir,—Dr. McDiarmid has dealt with the main aspects of Mr. Kirkwood's interesting letter in THE VETERINARY RECORD of June 4th, 1960, referring to the Brucellosis Symposium; there are, however, a number of points to which I think I should reply.

The idea of suggesting free S.19 vaccination in the Oxfordshire area was indeed in the hope of increasing rapidly the number of immune cattle and consequently decreasing further the amount of infection in the herds. I am sorry to say that the remuneration of the veterinary officer was not a factor considered in this context and I would suggest that Mr. Kirkwood should raise this point again with his local veterinary association.

We were well aware of the problems Mr. Kirkwood mentions relating to his particular client. It was precisely because of these difficulties that the Technical Group has continued to consider and to recommend clarification in the legislation and responsibility for action in brucellosis. In the present somewhat confused situation there will be many more persons disorientated in the "olecranon gluteal" dilemma than Mr. Kirkwood and his client. It is my hope therefore that the various recommendations put forward by the Oxfordshire working group will eventually relieve Mr. Kirkwood and his clients of this uncomfortable position and that we will all know exactly what is required of us when brucellosis is found in a milking herd. Inadvertently Mr. Kirkwood has paid us a considerable compliment; he may not be aware of it but to get *one* Department aware of brucellosis is generally regarded as a feat; to have 4 separate Departments actually interested in this disease is a miracle, and to some extent a tribute to our efforts to achieve interest in a long-neglected but preventable problem!

I am therefore grateful to Mr. Kirkwood for emphasising and highlighting the problems of legislative and administrative control in this disease from his own personal experience. I am sure, however, that he will agree that the prevention of even one case of human brucellosis is well worth the teething discomfort for himself and his client or for any of the professional personnel involved at the beginning of one of the first attempts to do anything about brucellosis in England in a concerted way.

Yours faithfully,
P. W. BOTHWELL.

Department of Public Health,
Tower Hill,
Bristol, 2.
July 18th, 1960.

Sir,—Mr. Govaerts's letter (*Vet. Rec.* **72**. 585) is important in that it makes the point that Strain 19 vaccination has lacked firm planning from the start. The vaccination scheme is vague in conception and unsatisfactory in results, because farmers have not been impressed by the necessity of informing their veterinary surgeons when calves are ready for vaccination.

I am aware that this should be carried out at the annual tuberculin test, but apart from the fact that the veterinary surgeon has his hands full with the business of testing, the heifers are presented at all ages, with only a very few at the right age.

I suggest that a notification of the birth of heifer calves could be carried out through the medium of the Milk Marketing Board, and that the Ministry should send out a list of calves at the appropriate time to the veterinary surgeon concerned. The calves could be marked with a plain red tag when they have been injected.

In conclusion, I think the parsimonious policy of not granting a mileage allowance for calf vaccination does little to inspire enthusiasm for a scheme already tottering under the weaknesses outlined above.

Yours faithfully,
W. B. QUARMBY.

The Veterinary Surgery,
Peel Place,
North Bar Without,
Beverley,
E. Yorks.
July 19th, 1960.

Investigations into "Disease" of Turkey Poults

Sir,—Since the end of May we have encountered 45 outbreaks of "disease" in turkey poults associated with high mortality and constant *post-mortem* lesions. Birds died in good condition after a very short illness and mortality rates ranged from 10 to 70 per cent. Affected poults were usually about 4 weeks old, but birds 12 to 15 weeks old were sometimes involved.

The consistent *post-mortem* finding was engorgement and congestion of the kidneys. Other lesions often present, but not necessarily in all the birds within a group, were enteritis, distension of the gizzard by coarse material, haemorrhages or necrotic foci in the liver and, less commonly, haemorrhages on the pancreas, white flecks on the air sacs and generalised oedema. Microscopic and cultural examinations failed to reveal any known specific infection.

The similarity of the liver lesions to those described in the U.S.A. by Snoeyenbos *et al.* (1959) and in Canada by Mongeau *et al.* (1959) led us to attempt to demonstrate a virus by chick embryo techniques. The resultant mortality and lesions in the embryos at the first passage also suggested virus infection, but subsequent passages and attempts to infect turkey poults with the original affected material were unsuccessful.

Although the possibility of virus infection cannot yet be ruled out, the simultaneous and widespread

occurrence of outbreaks prompted us to consider nutritional factors. It was found that more than one commercial ration was involved, but mortality often ceased after a change of food. It may well be that this syndrome is not due to a single cause, but it would seem likely that a solution may be found by a more complete study of its epidemiology. The purpose of this letter is to draw attention to the syndrome and our preliminary observations.

Yours faithfully,
A. J. STEVENS,
C. N. SAUNDERS,
J. B. SPENCE.

Veterinary Investigation Centre.
AUDREY G. NEWNHAM.
School of Veterinary Medicine,
Madingley Road,
Cambridge.
July 22nd, 1960.

References

SNOEYENBOS, G. H., BASCH, H. I., & SEVOIAN, M. (1959). *Av. Dis.* iii. 377.
MONGEAU, J. S., TRUSCOTT, R. B., FERGUSON, A. E., & CONNELL, M. C. (1959). *Ibid.* iii. 388.

Copper Poisoning

Sir,—In a letter published in THE VETERINARY RECORD of June 11th, Dr. Ruth Allcroft referred to the difficulty for either the farmer or the veterinary surgeon to know whether copper had been added to pelleted feeds or not.

It was to meet the undoubted need for farmers and veterinary surgeons to know what additives are administered to livestock in the course of normal feeding that this Association, in conjunction with other national trade associations, last year introduced a scheme for the voluntary declaration of the presence of certain additives in feeding-stuffs.

The scheme, which was agreed with the Ministry of Agriculture, Fisheries and Food, came into operation on June 1st, 1959, and added copper in excess of 50 parts in 1,000,000 was listed as one of the additives to be declared.

Yours faithfully,
TOM DUKE,
President.

The Compound Animal Feeding Stuffs
Manufacturers National Association Limited,
Cereal House,
Mark Lane,
London, E.C.3.
July 20th, 1960.

Orthopaedic Surgery in Farm Animals

Sir,—We have read Mr. Vaughan's contribution on patellar desmotomy in cattle (*Vet. Rec.* **72.** 399, May 21st) and Mr. Williams's letter (June 25th) with great interest.

On July 14th we performed a median patellar desmotomy on a 6-year-old Friesian cow that had calved 3 weeks. For some time she had suffered a "stringhalt" gait which deteriorated to temporary upward fixations and, finally, to a permanent fixation of 48 hours' duration. Using 500 mg. chlorpromazine hydrochloride* intravenously and local anaesthesia under 2 per cent. lignocaine hydrochloride,† the operation was performed in the standing position through a 2" incision.

The animal was walking normally immediately after the operation.

Yours faithfully,
PETER B. CLARKE,
DESMOND E. GUNNER.

Fairfield House,
Uckfield,
Sussex.
July 15th, 1960.

* Largactil: May and Baker Ltd.
† Versicaine: May and Baker Ltd.

A Dangerous Epilogotic

Sir,—There has of recent years been increasing evidence of the spread of a dangerous epilogotic affecting the literature of biology. As a young epornithologist, I have recently found similarities between a disease of poultry and a well-known epeubacterialic of *E. coli*. Unfortunately, not being familiar with the terminology, I missed in my search of the literature the fundamental epichthyological principles laid down by all the eminent workers in this field who have so ably extended the original and basic concepts of the early epiphytiologists. I found the word epizootic suitably covered both my observations and those on trout, but sank into a decline when trying to reconcile my terminology with that of the other disciplines. I was on the dangerously ill list for many months—neglected and spurned by the whole medical profession who steadfastly (and righteously) refused me the use of demos—until my colleagues proposed epibiotic.

I make no apology for using epilogotic in my title. I considered epigrammatic, but this also has been used in another sense. If in the interests of specialisation and of purity of etymology we have multiple words for one meaning, let us extend the confusion and have multiple meanings for one word.

Yours faithfully,
M. F. PULSFORD.

24, High Street,
Burnside,
South Australia.
July 11th, 1960.

Paraplegia and Paraparesis in the Dog

Sir,—I read with considerable interest Deirdre M. Milnes's paper upon the subject of paraplegia and paresis in the dog (*Vet. Rec.* **72.** 511). I have seen a number of cases of paraplegia amongst war dogs but most of the subjects have been elderly Alsatians. In a proportion of these cases I have been unable to definitely establish the cause of the condition and I have had to ascribe it to a functional defect of the involved nerves—an unsatisfactory diagnosis. However, in some of the other cases that I have seen I have been able to demonstrate the cause as chronic ossifying pachymeningitis when a *post-mortem*

examination has been carried out. One case was clearly caused by partial protrusion of the intervertebral disc and as it is the only one that I have seen in an Alsatian I would like to add this case history to those described by Mrs. Milnes.

The subject was an 8½-year-old male Alsatian. He was found paralysed one morning after being attached to a running line all night. Examination was difficult because he was unable to support himself and he exhibited severe pain in the lumbar region. A strong sedative was administered and a further examination made next day. The pain was not so severe but the dog was still unable to stand or move his hind limbs except to a very limited degree. He remained hospitalised for 25 days during which time a variety of treatments were applied including diathermy, strychnine, and cortisone therapy, but all without success.

Post-mortem examination revealed hyperaemia in the spinal cord between 3rd and 7th lumbar vertebrae. There was also a little free blood in the same region under the dura mater. Haemorrhages were observed in the root of the 6th lumbar nerve and to a lesser extent the 5th and 7th. Over the intervertebral space between the 5th and 6th lumbar vertebrae the longitudinal ligament was swollen. On section of the vertebral column at this point it was found that the intervertebral disc was swollen and that there was dorsal displacement of the nucleus pulposus without rupture of the annulus (Hansen Type II). There was also hyperaemia in the surrounding collagen fibres of the annulus.

Yours faithfully,
R. B. HEARNE.

1 War Dog Training Unit,
British Forces Post Office 16.
July 17th, 1960.

Simultaneous Presentation of Twin Lambs

Sir,—It is difficult to follow Mr. Rainey's arguments under the above heading in THE VETERINARY RECORD dated July 16th.

First he suggests that my observations are not applicable to his country, and then he goes on to describe cases dealt with in a very crude manner, ignoring basic obstetrical principles.

The conditions he describes, where the experienced sheep breeder damages the lambing ewe before calling veterinary aid, shows how necessary it is to instruct not only the young shepherd and the novice but also the older man who may know a lot about sheep breeding but very little about ovine anatomy and obstetrics. He must be told frankly and shown, if possible, what is safe for him to do and what must be left to the veterinarian. This is a prerequisite of successful ovine obstetrical practice. Proper positioning and preparation of the ewe makes all the difference to examination and correction of presentation. What may look like a complicated difficult case often resolves into a much simpler procedure.

The simultaneous presentation of twin lambs, for example, which is met with in this country in about the same proportion as quoted for Tasmania (but less in the smaller Welsh ewes), is made much easier with the ewe in the suspended position and the vagina filled with oil. The lamb whose body is least forward tends to drop into the uterus. The identification and pairing of the presented parts is made easier (this is the important stage prior to any traction or retropulsion), and the ewe is less able to strain before one is ready to effect delivery. I know the vulsellum forceps is used successfully but it is not a kind obstetrical instrument; I think a practised eye socket grip or, failing that, a string looped behind the ears is preferable.

As for Mr. Rainey's remark that Australia on the whole is not economically ready for the caesarean section, I should add that it is not an expensive operation. In fact, when performed at the right time and for the right indications it is a most valuable, satisfactory and time-saving procedure. The important thing is to recognise the indications for operation quickly, and to act instead of struggling on *per vaginam* against one's better judgment in the hope of saving time.

Yours faithfully,
T. HUGHES ELLIS.

Compton House,
Chwilog,
Caerns.,
N. Wales.
July 19th, 1960.

Sir,—May I through the courtesy of your columns comment upon the letter from Mr. J. W. Rainey published in THE VETERINARY RECORD of July 16th, 1960?

I personally doubt if there is apathy towards the subject of ovine obstetrics in Britain. During the course of assistantships and locums I found that there was considerable interest in the subject.

I would refer him to a letter from Mr. G. A. Oakley which appears in the same issue of THE VETERINARY RECORD as the paper by Mr. T. Hughes Ellis; this, I would suggest, provides the answer to the problem of simultaneous presentation of twin lambs, as well as to many other obstetrical problems in the ewe. My own findings have been similar to those of Mr. Oakley, and over a period of 8 years I have not hesitated to make use of the benefits of epidural anaesthesia.

The technique now in use in this practice is the one arrived at by my previous partner Mr. J. J. Murdoch. The site used is the lumbo-sacral junction, using a three-inch fifteen S.W.G. needle and from 3 to 5 c.c. of "Ravocaine." I have encountered no permanent lameness in the use of epidural anaesthesia; occasionally a temporary lameness of one hind leg occurs. Correction of dystocias can be made with remarkable ease, in the absence of straining by the ewe and with the relaxation of the uterus which ensues.

I also believe that if it is economical to attempt prolonged and hazardous lambings it should be economical to perform caesarean operations.

Yours faithfully,
ALEXANDER WHITELAW.

121, Nethergate,
Dundee.
July 19th, 1960.

Obstetrics

Sir,—May I be permitted to add what appears to me to be rather an interesting postscript to Mr. Straiton's paper on "Obstetrics" in THE VETERINARY RECORD (72. 600)?

When Mr. Straiton states that obstetrical problems in the cat are uncommon, he should perhaps have qualified it by adding "in England." I worked for some time in Victoria, Australia and there, on occasion, I performed as many as 3 caesarean sections on cats in an afternoon! In fact, in that part of Australia, a high percentage of cats having kittens ran into trouble. Pituitary was of little help. I thought I had the answer in that most kittens out there suffered from rickets, and that that narrowed the pelvic lumen. Then I had to perform a caesarean section on my own cat which had gone to Australia with me, and had been reproducing uneventfully for years before going out.

The reason, therefore, we so seldom have to assist labour in the cat in England would appear to be as much due to a suitable environment as to any other factor.

Curiously enough, bitches in Victoria do not appear to have a higher incidence of whelping difficulties when compared with animals in this country.

Yours faithfully,
R. S. HARBORD.

153, Hamstead Road,
Great Barr,
Birmingham, 22A.
July 24th, 1960.

Spontaneous Diabetes Mellitus in the Cat

Sir,—The paper by Messrs. Wilkinson and Keen on spontaneous diabetes mellitus (*Vet. Rec.*, July 9th) prompts me to record the following case history in the hope that it may prove of interest and that someone might be able to suggest a suitable insulin dosage for future cases.

The subject was a neutered male cat, aged 7 years; the owner had noted progressive emaciation, thirst, occasional vomiting, and polyuria, for approximately 3 months. Cataracts were present in both eyes, and Benedict's qualitative urine test gave a positive +++ reaction.

A tentative diagnosis of diabetes mellitus was made and insulin therapy was instituted; it was continued for 10 days. Novolente insulin was used throughout, and the dosage was as follows: 5 days on 10 units s/c each morning, 2 days on 10 units in the morning and 5 units in the afternoon, and 3 days on 10 units both morning and afternoon. During the 10th night of treatment the cat developed violent convulsions followed by coma. It was destroyed in a moribund state on the morning of the eleventh day. An immediate *ante-mortem* sample of urine still showed positive +++ reaction to Benedict's qualitative reagent.

The *post-mortem* examination showed that macroscopic abnormalities included dilatation of the heart, absence of normal fatty tissues, and an extremely enlarged and thickened pancreas. A laboratory report on this latter organ by the pathological department of Glasgow University Veterinary School was as follows: "Only vestiges of islets remained. There was a great increase in fibrous tissue throughout the pancreas, both intra- and inter-lobular."

Yours faithfully,
OLWEN D. JAMES.

13, Australia Road,
Gabalfa,
Cardiff.
July 18th, 1960.

Some Observations on the Histopathology of Mulberry Heart Disease in Pigs

Sir,—In my recent article on "Some Observations on the Histopathology of Mulberry Heart Disease in Pigs" I omitted to acknowledge the great assistance which I received from Mr. G. H. Clement, F.R.I.C., of Messrs. Roche Products Ltd., in obtaining material from cases of Herztod.

May I make use of your columns to rectify my error and to apologise for it?

Yours faithfully,
J. D. J. HARDING.

Central Veterinary Laboratory,
New Haw,
Weybridge,
Surrey.
July 11th, 1960.

Reference

HARDING, J. D. J. (1960). *Res. Vet. Sci.* 1. 129.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
16th to 31st May, 1960		6	—	—	90	—	69
Corresponding period in	1959	8	—	1	41	—	53
	1958	4	—	1	26	—	77
	1957	16	—	8	35	—	57
1st Jan. to 31st May, 1960		117	—	14	1,267	—	467
Corresponding period in	1959	112	—	8	352	—	483
	1958	81	3	111	285	—	486
	1957	208	3	24	358	—	364